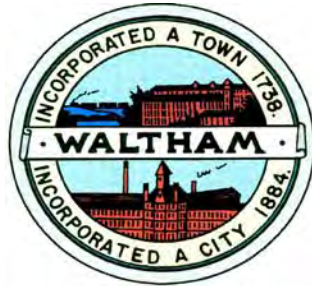


# The City of Waltham



**Invites  
Interested Parties  
To propose the best offer and or bid  
For the service or product herewith described:**

**Replacement of Water Mains and/or Water Services in Willard Street,  
Plimpton Street, Oak Street and Cedar Street**

**BID OPENING: 2:00PM Thursday May 15, 2014**

**LAST DAY FOR WRITTEN QUESTIONS: 12 Noon Thursday May 8, 2014**

## SECTION 00100 - INSTRUCTIONS TO BIDDERS

1. RECEIPT OF BIDS:

In accordance with the rules of Chapter 30, §39M the City of Waltham, Massachusetts will receive sealed Bids for the Replacement of Water Mains and/or Water Services in Willard Street, Plimpton Street, Oak Street and Cedar Street **until 2:00 PM local time on Thursday May 15, 2014 at the Purchasing Department Waltham City Hall, 610 Main Street, Waltham, MA 02452** at which time the Bids will be brought to the conference room and publicly opened and read aloud.

2. PROJECT DESCRIPTION:

Replacement of Water Mains and/or Water Services in Willard Street, Plimpton Street, Oak Street and Cedar Street

3. PROJECT SCHEDULE:

The work described in the Contract Documents shall begin within 15 days of the Notice to Proceed and be substantially complete, except for final paving, **within 150 calendar days**. Final paving shall be complete by October 1, 2014

4. LAST DAY FOR WRITTEN QUESTION

Only written questions will be addressed when sent via e-mail at [www.jpedulla@city.waltham.ma.us](mailto:www.jpedulla@city.waltham.ma.us). **Questions must be received by no later than 12 noon Thursday May 8, 2014**. All questions will be answered and responses issued via e-mailed addenda to all vendors of record. The addenda will also be posted on line at [www.city.waltham.ma.us/open-bids](http://www.city.waltham.ma.us/open-bids). See also paragraph 15 - Interpretations

5. CONTRACT DOCUMENTS:

The Technical Documents have been prepared Wright-Pierce of 40 Shattuck Road Andover, MA 01810 The documents may be obtained only in electronic format by visiting the City's web Site at [www.city.waltham.ma.us/open-bids](http://www.city.waltham.ma.us/open-bids) on or after **April 30, 2014**.

City Hall, Purchasing Office  
610 Main St.  
Waltham, MA 02452

Attn: Joe Pedulla, Chief Procurement Officer

The Contract Documents that will form the basis of this Contract are as defined in the General Conditions. Bidders must examine each of these documents, visit the location of the Work, and inform themselves of the difficulties attending the execution of the Work prior to the submission of their Bids. The CONTRACTOR shall give attention to the definitions included in the Contract Documents.

6. APPLICABLE LAW:

Bids for this project are subject to the provisions of Massachusetts General Laws Chapter 30, Section 39M as amended. In addition, applicable provisions of Massachusetts General Laws and Regulations and/or the United States Code and Code of Federal Regulations govern this Contract and any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflict between Code of Federal Regulations and State Laws and Regulations exist, the more stringent requirement shall apply.

The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

7. BID SECURITY:

Each bid must be accompanied by a 5% Bid Deposit in the form of a Bid Bond or a certified check on, or a treasurer's or cashier's check issued by a responsible bank or trust company, payable to the CITY OF WALTHAM. The Bid Bond shall be (a) in form satisfactory to the Owner substantially and materially conforming to the sample contained in the Contract Documents, (b) with a surety company qualified to do business in the Commonwealth of Massachusetts, and (c) conditioned upon the faithful performance by the Principal of the agreements contained in the Bid, (d) dated on or before the bid date, (e) accompanied by a current Power of Attorney, (f) signed by Surety. The Bid Deposit shall be in the amount of 5% of the value of the Bid. The Bid Deposit shall be sealed in a separate envelope from the Bid and then attached to the envelope containing the Bid.

All Bid Deposits of General Bidders, except those of the three lowest responsible and eligible General Bidders, shall be returned within five (5) days, Saturdays, Sundays and legal holidays excluded, after the opening of the General Bids. The Bid Deposits of the three lowest responsible and eligible General Bidders shall be returned upon the execution and delivery of the Contract or, if no award is made, within ninety (90) calendar days after the date on which Bids were opened; except that, if any General Bidder to whom the Contract is awarded fails to perform his/her agreement to execute the Contract and furnish a Performance and Payment Bonds in accordance with Chapter 30, §39M, the Owner may determine that such General Bidder has abandoned the proposed Contract, and thereupon the proposal made by such General Bidder in the Bid and the acceptance thereof by the Owner shall be null and void and the Bid Deposit of such General Bidder shall become and be the property of the Owner as liquidated damages for such failure and to indemnify the Owner for any loss, cost or damage sustained by the Owner as a result of such failure of the General Bidder to execute the Contract and furnish the required bonds as aforesaid; provided that the amount of the Bid Deposit which becomes the property of the Owner shall not, in any event, exceed the difference between the Bid price of such General Bidder and the Bid price of the next lowest responsible and eligible General Bidder; and provided further that, in case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting the General Bidder, his/her Bid Deposit shall be returned to him/her.

8. PERFORMANCE AND PAYMENT BONDS:

All Bidders are advised that this Contract will require Performance and Payment Bonds. Each Bond shall be for 50% of the amount Bid and must be furnished prior to the contract execution.

9. MODIFICATION AND WITHDRAWAL OF BIDS:

Bids may be modified or withdrawn only by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

No Bidder may withdraw or modify their Bid after opening of the Bids.

10. WAGE RATES:

Minimum Wage Rates as determined by the Commissioner of the Department of Labor and Industries apply to this project. A copy of the prevailing wage schedule for this project is provided on line at [www.city.waltham.ma.us/open-bids](http://www.city.waltham.ma.us/open-bids)

The CONTRACTOR shall provide weekly payroll records to the OWNER for its file for the duration of the project for such items as Work is being performed under this Contract

All bids shall be accompanied by the Bidder's certification regarding payment of prevailing wage rates in the form set forth below. No Invoices will be processed by the OWNER until all certified payrolls are submitted

11. PERMITS:

All fees for permits or licenses required for this project by the Town are waived. The contractor, however, is required to obtain all necessary permits.

12. AWARD OF CONTRACT:

The general contract will be awarded on the basis of the Bid to the lowest responsible and eligible general bidder complying with the conditions and requirements provided in these Instructions, the bid forms and the other bid documents. A "responsible" bidder is a bidder demonstrably possessing the skill, ability and integrity necessary to faithfully perform the work called for by the contract, based upon a determination of competent workmanship and financial soundness in accordance with the provisions of Massachusetts General Laws Chapter 30§39M. An "eligible" bidder is a bidder who is able to meet the requirements for bidders set forth in said Chapter 30§39M and not debarred from bidding and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

The successful Bidder will be notified in writing, by mail or otherwise, that their bid has been accepted and that they have been awarded the contract. The successful Bidder shall execute the contract and furnish the required bonds, at the offices of the OWNER if requested, within ten days after presentation of the contract to the Bidder or notice to the Bidder that the contract is ready for execution.

The OWNER shall not enter into a contract with, and shall not approve as a subcontractor furnishing labor and materials for a part of any work of this contract, a foreign corporation which has not filed with the OWNER a certificate of the Secretary of State of the Commonwealth of Massachusetts stating that such corporation has complied with Sections 3 and 5 of Chapter 181 of the Massachusetts General Laws and the date of such compliance. The OWNER shall report to said Secretary of State and to the Department of Corporations and Taxation of the Commonwealth of Massachusetts any foreign corporation performing any work under this contract or any such subcontract, and any person, other

than a corporation, performing work under this contract or any such subcontract, and residing or having a principal place of business outside the Commonwealth of Massachusetts.

If the bidder selected as the general contractor fails to perform his agreement to execute the contract in accordance with the terms of his bid and furnish a performance bond and also a labor and materials payment bond as stated in his bid, the award will be made to the next lowest responsible and eligible general bidder, subject to the provisions of said Chapter 30§39M. The thirty-day time limit shall not be applicable to a second or subsequent award made after the expiration of the time limit with the consent of said next lowest responsible and eligible general bidder, and made because the original award made within the time limit was invalid, or because the general bidder failed to execute the contract or to provide a performance bond and a labor and materials payment bond.

13. PREPARATION AND SUBMISSION OF BIDS:

Each Bid shall be submitted on the Form for General Bid included with the Contract Documents. All blank spaces for Bid prices must be filled in with the unit price for the item or the lump sum price for which the Bid is made.

Forms for General Bid shall be completed in ink or by typewriter. The Bid price for each item on the form shall be stated in words, and figures, as provided. Discrepancies between unit prices and their respective total amounts will be resolved in favor of the unit prices. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

Bid which includes for any item a Bid Price that is abnormally low or high may be rejected as unbalanced.

Bids by corporations shall be executed in the corporate name by a duly elected corporate officer accompanied by evidence of authority to sign and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

Bids by partnerships shall be executed in the partnership name and signed by a partner, whose title shall appear under the signature. The official address of the partnership shall be shown below the signature.

All names shall be typed or printed below the signature.

The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

The address to which communications regarding the Bid are to be directed shall be shown.

One copy of each Bid shall be submitted in a sealed envelope plainly marked on the outside with the name of the Bidder, Bidder's address, and the name of the project for which the Bid is submitted. The Bid shall be submitted in a separate envelope from the Bid and attached to the envelope containing the Bid. Section 00300 shall be submitted in its entirety, before the time of the bid opening, to be considered an acceptable bid.

If forwarded by mail, the sealed Bid marked as described above together with the Bid Deposit shall be enclosed in another envelope with the notation "BID ENCLOSED" on the face and addressed as indicated in the Advertisement for Bids.

14. EXAMINATION OF CONTRACT DOCUMENTS AND SITE:

It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work, (c) consider federal, state and local laws and regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify ENGINEER of all conflicts, errors or discrepancies in the Contract Documents.

Before submitting a Bid, each Bidder may, at Bidder's own expense, make such additional examinations and tests which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Document.

On request in advance, OWNER will provide each Bidder access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.

The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by CONTRACTOR. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by OWNER unless otherwise provided in the Contract Documents.

The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this paragraph that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

15. INTERPRETATIONS:

All questions about the meaning or intent of the Contract Documents shall be received in writing by the **City of Waltham Purchasing Department, 610 Main Street, Waltham, MA 02452 Attn: Joseph Pedulla, email: [jpedulla@city.waltham.ma.us](mailto:jpedulla@city.waltham.ma.us), before noon on May 8, 2014.**

Written clarifications or interpretations will be issued by Addenda before the Bid opening date. Only questions answered by formal written Addenda will be binding. Oral and other clarifications or interpretations will be without legal effect. Addenda will be emailed or sent by facsimile to all parties recorded as having received the Contract Documents.

Each Bidder shall be responsible for determining that he/she has received all Addenda issued.

Copies of the Addenda will be made available for inspection at the locations listed in the Invitation where the Contract Documents are on file.

16. LIQUIDATED DAMAGES:

Provisions for liquidated damages are set forth in Section 00300 –Form for General Bid..

17. POSTPONEMENT OF DATE FOR PRESENTING AND OPENING BIDS:

The OWNER reserves the right to postpone the date for presentation and opening of Bids and will give notice of such postponement to each prospective Bidder.

18. PRICES:

In the event of discrepancies between the Price totals quoted in the Bid and the unit price figures, the unit price figures shall control. The Price is to include the furnishing of all material, plant, equipment, tools, labor, and other facilities required for the completion of the Work except as may be otherwise expressly provided in the Contract Documents. After the award of the Contract, if the CONTRACTOR desires to use equipment or methods other than those specified or shown on the Drawings, the CONTRACTOR shall submit data to prove equality, submit reason for change, submit the amount of credit (if any) to the Contract Price, and pay for all expenses and costs for services provided to the OWNER by the ENGINEER for evaluation of the substitution to arrive at a decision as to the suitability with respect to the design intent.

19. REJECTION OF BIDS:

The Owner reserves the right to reject any or all Bids, or to accept any Bid which it deems to be in its best interest. Any Bid which is incomplete, obscure, or irregular may be rejected; any Bid having erasures or corrections in the price sheet may be rejected; any Bid which omits a price on any one or more items may be rejected; and any Bid accompanied by an insufficient or irregular Bid Deposit may be rejected.

If the Bidder submits a Bid before the deadline time for submission, the Bidder may, in writing, modify his/her original Bid for submission. No oral, telephone, or telegraphic modifications will be considered.

20. BIDDER'S QUALIFICATIONS:

It is the intention of the OWNER not to award this Contract to any Bidder who does not furnish evidence satisfactory to the OWNER that he/she has the ability, skill, integrity and experience in this class of work and that he/she has sufficient capital and plant to enable him/her to prosecute the same successfully and to complete it within the specified time.

In determining the skill, ability, and integrity of the responsible and eligible Bidders, the following elements will be considered: whether the Bidder has (a) previously defaulted on, failed to perform properly, or failed to complete on time contracts of similar nature; (b) habitually, and without just cause, neglected payment for material or to employees; (c) a permanent place of business; (d) adequate plant and equipment to do the Work properly; (e) a suitable financial status to meet the obligations incident to the Work; (f) appropriate technical experience; and (g) labor force that can work in harmony with all other elements of labor employed.

21. LOW BIDDER AND ACCEPTANCE OF THE BID:

Except where the OWNER exercises its right to reject any or all Bids, the Contract will be awarded to the lowest responsible and qualified Bidder **on the basis of the Bid.**

Within a maximum period of ninety (90) days after opening the Bids the OWNER will prepare a Notice of Award signed by a duly authorized representative of the OWNER. This Notice of Award shall bind the successful Bidder to execute the Contract.

The rights and obligations provided for in the Contract shall become effective and binding upon the Parties only with its formal execution by the OWNER.

22. EXECUTION OF CONTRACT AGREEMENT AND DAMAGES FOR A FAILURE TO EXECUTE:

Any Bidder who's Bid shall be accepted will be required to execute the Contract Agreement and provide the required Performance Bond, Payment Bond and Insurance Certificates within ten (10) days after Notice of Award is received by the CONTRACTOR. Failure or neglect to do so shall constitute a breach of the Agreement affected by the acceptance of the Bid.

The damages to the OWNER for such a breach shall include loss from the interference with his/her construction program and other items. The amount of the certified check or Bid Bond accompanying the Bid of such Bidder will be retained by the OWNER as liquidated damages for such breach. In the event any Bidder whose Bid shall be accepted shall fail or refuse to execute the Contract Agreement hereinbefore provided, the OWNER may, at its option, determine that such Bidder has abandoned the Contract and there upon his/her Bid and the acceptance thereof shall be null and void and the OWNER will be entitled to liquidated damages as above provided.

23. SAFETY AND HEALTH REGULATIONS:

This project is subject to the Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments and 29CFR, Part 1910, General Industry Safety and Health Regulations Identified as Applicable to Construction. CONTRACTOR shall be familiar with the requirements of these regulations.

The successful Bidder shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54).

The successful Bidder shall have a competent person or persons, as required under the Occupational Safety and Health Act on the site to inspect the Work and to supervise the conformance of the Work with the regulations of the Act.

This project is also subject to the Massachusetts Department of Labor and Workforce Development, Division of Industrial Safety (Ch. 454 CMR 10.00 et seq.) "Rules and Regulations for the Prevention of Accidents in Construction Operations (Industrial Bulletin No. 12)." CONTRACTOR shall be familiar with the requirements of these regulations.

24. CONTRACTOR'S RECORDS:

The CONTRACTOR shall comply with Massachusetts G.L.C. 30, S.39 R as explained below.



The CONTRACTOR shall retain records for at least six years after final payment.

During this 6 year period, the OWNER, the Inspector General shall have the right to inspect these records.

The CONTRACTOR shall notify the Awarding Authority of any changes in bookkeeping and related matters, with a CPA letter of comment.

Prior to the execution of the Contract, the CONTRACTOR shall file a statement of management and internal accounting controls.

The CONTRACTOR shall file annually an audited financial statement.

The final statement filed shall include the date of final payment.

25. POWER OF ATTORNEY:

Attorneys-in-fact who sign Contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

26. GUARANTEES:

The CONTRACTOR shall guarantee that the Work and Services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of substantial completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted in accordance with the subsection of the Agreement titled "Partial Acceptance", the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.

If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the OWNER may notify the CONTRACTOR in writing to make the required repairs, corrections or replacements. If the CONTRACTOR neglects to commence making such repairs, corrections or replacements to the satisfaction of the OWNER within seven (7) days from the receipt of such notice, or having commenced fails to prosecute such Work with diligence, the OWNER may employ other persons to make said repairs, corrections or replacements, and charge the costs, including compensation for additional professional services, to the CONTRACTOR.

27. FUNDS APPROPRIATION.

THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.

28. THE AWARDING AUTHORITY RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS, OR ANY PART OF ANY BID, WHICH IN THE OPINION OF THE AWARDING AUTHORITY, IS IN THE BEST INTERESTS OF THE CITY OF WALTHAM.

29. THE TAX ATTESTATION CLAUSE, CERTIFICATION OF NON-COLLUSION AND THE CERTIFICATE OF VOTE AUTHORIZATION, are required by statute and are an integral part of the Invitation for Bid and must be completed and signed by the person submitting the Bid, or by the person/persons who are officially authorized to do so. Failure to do so may disqualify the bid.
30. BID OPENING INCLEMENT WEATHER  
If, at the time of the originally scheduled bid opening, City Hall is closed to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 PM on the next normal business day. Bids will be accepted until that date and time.

**\*\*\* END OF SECTION \*\*\***

**AGREEMENT**

THIS AGREEMENT, made this \_\_\_\_\_ day of \_\_\_\_\_, 20 14, by and between the party of the first part, the City of Waltham hereinafter called "OWNER", acting herein through its City Mayor, and the party of the second part, \_\_\_\_\_ doing business as (a corporation) (a partnership) (a joint venture) (an individual)\* located in the (City) (Town)\* of \_\_\_\_\_, County of \_\_\_\_\_, and State of \_\_\_\_\_, hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the project described as follows:

**Replacement of Water Mains and/or Water Services in Willard Street, Plimpton Street, Oak Street and Cedar Street**

hereinafter called the project, for the sum of \_\_\_\_\_ Dollars and \_\_\_\_\_ Cents (\$ \_\_\_\_\_) and all extra work in connection therewith, under the terms as stated in the General and Supplementary Conditions; and at his (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in Section 00300, BID FORM, Section 00700, GENERAL CONDITIONS, Section 00800, SUPPLEMENTARY CONDITIONS, the plans, which include all maps, plates, blue prints, and the specifications and contract documents therefore as prepared by Woodard & Curran, September 2010.

The CONTRACTOR hereby agrees to commence work under this contract within 15 days of the written Notice to Proceed given by the OWNER to the CONTRACTOR and to fully complete the work described in the contract documents, except for final paving, within 100 calendar days.

The CONTRACTOR further agrees to pay as liquidated damages the sum of **\$1,100.00** for each consecutive calendar day thereafter during which the work has not been fully completed, as provided in the Liquidated Damages paragraph of Section 00800, SUPPLEMENTARY CONDITIONS.

The CONTRACTOR shall not discriminate against or exclude any person from participation herein on grounds of race, religion, color, sex, age or national origin; and that it shall take affirmative actions to insure that applicants are employed, and that employees are treated during their employment, without regard to race, religion, color, sex, age, handicapped status, or national origin.

The CONTRACTOR shall not participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue Code of 1986, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws.

IN WITNESS WHEREOF, the parties to these presents have executed this Agreement in six (6) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

**AGREED:**

**City of Waltham, Massachusetts**  
(Owner)

By \_\_\_\_\_ Date: \_\_\_\_\_  
Jeannette McCarthy, Mayor

\_\_\_\_\_, Date: \_\_\_\_\_  
Joseph Pedulla, Purchasing Agent

\_\_\_\_\_, Date: \_\_\_\_\_  
Steve Casazza, Chief Engineer

\_\_\_\_\_, Date: \_\_\_\_\_  
**(Contractor)**

By \_\_\_\_\_  
\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Address)  
\_\_\_\_\_  
(City and State)

Approved as to Form:

By \_\_\_\_\_ Date: \_\_\_\_\_  
John Cervone, City Solicitor

In accordance with M.G.L.C. 44, Section 31C, this is to certify that an appropriation in the amount of this Contract is available therefore and that the City Mayor has been authorized to execute the Contract and approve all requisitions and change orders.

By \_\_\_\_\_ Date: \_\_\_\_\_  
Paul Centofanti, City Auditor

**CONTRACTOR’S CERTIFICATION**

A Contractor will not be eligible for award of a contract unless such Contractor has submitted the following certification, which is deemed part of the resulting contract:

\_\_\_\_\_  
Name of General Contractor

certifies that:

1. It intends to use the following listed construction trades in the work under the contract:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Will comply with the minority workforce ratio and specific affirmative action steps contained herein; and
3. Will obtain from each of its subcontractors and submit to the contracting or administrating agency prior to the award of any subcontract under this contract the subcontractor’s certification required by these bid conditions.

\_\_\_\_\_  
Signature of Authorized  
Representative of Contractor

**PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS: That we \_\_\_\_\_

(Name of Contractor)

a \_\_\_\_\_ hereinafter called "Principal" and  
(Corporation, Partnership, Joint Venture or Individual)

\_\_\_\_\_ of \_\_\_\_\_, State of \_\_\_\_\_  
(Surety) (City)

hereinafter called the "Surety" and licensed by the State Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to the Town of \_\_\_\_\_, Massachusetts, hereinafter called "Owner", in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas the Principal has entered into a certain contract with the Owner (the "Construction Contract"), dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, for the construction described as follows:

*Contract for the Sewer Replacement Project: Totten Pond Road/ Arcadia Avenue & Humboldt Street, Waltham, MA.*

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of the Construction Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under the Construction Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise, this obligation shall remain in full force and effect.

PROVIDED, FURTHER, that the Surety's obligation under this Bond shall arise after (1) the Owner has declared the Principal in default of the Construction Contract or (2) has declared that the Principal has failed, or is otherwise unable or unwilling, to execute the work consistent with, and in conformance to, the Construction Contract (collectively referred to as a "Contractor Default"). The determination of a Contractor Default shall be made solely by the Owner.

When the Surety's obligation under this Bond arises, the Surety, at its sole expense and at the consent and election of the Owner, shall immediately take one of the following steps: (1) arrange for the Principal to perform and complete the work of the Construction Contract; (2) arrange for a contractor other than the Principal to perform and complete the work of the Construction Contract; (3) reimburse the Owner, in a manner and at such time as the Owner shall decide, for all costs and expenses incurred by the Owner in performing and completing the work of the Construction Contract.

If the Surety does not proceed as provided in this Bond with due diligence and all deliberate speed, the Surety shall be deemed to be in default of this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner.

After the Surety's obligation under this Bond arises, the Surety is obligated, to the limit of the amounts of this Bond, for (1) the correction of defective work and completion of the Construction Contract; (2) additional

design, professional services, and legal costs, including attorney's fees, resulting from the Contractor Default or from the default of the Surety under this Bond; (3) any additional work beyond the Construction Contract made necessary by the Contractor Default or default of the Surety under this Bond; and (4) liquidated damages as provided in the Construction Contract, or if none are so specified, actual and foreseeable consequential damages resulting from the Contractor Default or default of the Surety under this Bond.

Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction in the Commonwealth of Massachusetts.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Construction Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Construction Contract or to the work or to the specifications.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ ( ) counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_. ATTEST: \_\_\_\_\_

\_\_\_\_\_

Principal

\_\_\_\_\_  
(Principal Secretary)

By

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Address – Zip Code)

\_\_\_\_\_ (SEAL)  
Witness as to Principal

\_\_\_\_\_  
\_\_\_\_\_  
(Address – Zip Code)

ATTEST:

\_\_\_\_\_  
Surety

By

\_\_\_\_\_  
(Attorney-in-Fact)  
\_\_\_\_\_

(Address – Zip Code)

\_\_\_\_\_ (SEAL)  
Witness as to Surety

\_\_\_\_\_  
\_\_\_\_\_  
(Address – Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

**PAYMENT BOND**

Any singular reference to CONTRACTOR, Surety, OWNER or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

**CONSTRUCTION CONTRACT**

Date:

Amount:

Description (Name and Location):

**BOND**

Date (Not earlier than Construction Contract Date):

Amount:

Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

SURETY

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

SURETY

Company: (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:



1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.
2. With respect to the Owner, this obligation shall be null and void if the Contractor:
  - 2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and
  - 2.2. Defends, indemnifies and holds harmless the Owner from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. The Surety shall have no obligation to Claimants under this Bond until:
  - 4.1. Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
  - 4.2. Claimants who do not have a direct contract with the Contractor:
    1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
    2. Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
    3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.
5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.
6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
  - 6.1. Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 6.2. Pay or arrange for payment of any undisputed amounts.
7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction

Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

9. The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2 (iii), or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is, that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

12.1. Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment: that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2. Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contractor Documents and changes thereto.

15.3. Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

## SECTION 00830 D - CHANGE ORDERS

### Policy:

This section supplements Article 12, Change of Contract Price, in the General Conditions and Supplementary Conditions.

NO WORK IS TO COMMENCE UNTIL THE WORK ORDER IS SIGNED AND APPROVED BY THE MAYOR.

All executed change orders submitted to the Engineer for review and processing must be prepared in accordance with the attached change order format with the appropriate number of copies, calculation sheet(s) and all other supporting documentation necessary for evaluation. Failure to comply with these instructions will result in delays in processing the change order.

In order to avoid possible delays with approval of change orders, at the beginning of the project and as circumstances warrant, the Contractor shall submit a list of construction equipment, identifying major pieces of equipment to be utilized on the project. The list shall include the Contractor's designation, if any, the manufacturer, model, year of manufacture, serial number, size and horsepower of equipment. The Contractor shall also provide for approval a proposed bluebook equipment rental rate development that separately lists for each piece of equipment the monthly rental rate, area adjustment factor, depreciation factor, estimated operating cost per hour and total hourly rate. In the event the Contractor fails or is unable to provide appropriate rate information the Engineer may develop equipment rental rates for use on change orders.

### Payment of Change Orders:

Payment of all change orders shall be in accordance with the relevant provisions of Massachusetts General Laws, Chapter 30, Section 39G for non-building construction and Section 39K for building construction as amended from time to time.

Payment of change orders shall be made in accordance with one of the following three methods:

- A. Existing unit prices as set forth in the contract; or
  - B. Agreed upon lump sum or unit prices; or
  - C. Time and materials
- A. Payment for work for which there is a unit price in the contract:

Where the contract contains a unit price for work and the Engineer orders a change for work of the same kind as other work contained in the contract and is performed under similar physical conditions, the Contractor shall accept full and final payment at the contract unit price(s) for the acceptable quantities. Under certain circumstances, the unit prices may be subject to revaluation and adjustment. See Article 11 in the Supplementary Conditions.

B. Payment for work or materials for which no price is contained in the contract:

If the Engineer directs, the Contractor shall submit promptly in writing to the Engineer an offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. The stated price, either lump sum or unit price, shall be divided so as to show that it is the sum of:

1. The estimated cost of Labor, plus
2. Direct Labor Cost, plus
3. Material and Freight Costs, plus
4. Equipment Costs, plus
5. Markup not to exceed 10% on the sum of the change order for items 2 through 4 for overhead and profit (if applicable),
6. No markup will be allowed for additions to Police Details.
7. In the case of work done by a subcontractor, markup to the subcontractor's total shall not to exceed 5%, plus
8. Credits for work deleted from the contract.

C. Payment for work on a time and materials basis:

Unless an agreed lump sum and/or unit price is obtained as noted above and is so stated in the change price, the Contractor shall accept as full payment for which no agreement is contained in contract, an amount equal to:

1. The estimated cost of Labor, plus
2. The Direct Labor Costs, plus
3. Equipment Costs, plus
4. Material and Freight Costs, plus
5. An amount not to exceed 10% of the sum of all time and materials for the general contractor, plus
6. No markup will be allowed for additions to Police Details
7. In the case of work done by a subcontractor, markup to the subcontractor's total shall not to exceed 5%, plus
8. Credit for work deleted from the Contract.

Explanation of items 1 through 8 as outlined in "B" and "C" above:

1. Labor - Only those workers employed on the project who are doing the extra work, including the foreman in charge, are allowable. General foremen, superintendents, or other supervisory personnel are considered to be included in the overhead markup as provided in note 5. Hourly labor rates in excess of those as listed in the contract wage rates require documentation. As a minimum, an explanation and the appropriate copy of the certified payroll are required.

2. Direct Labor Costs - These costs are limited to those which are required in the contract document. Coverage in excess of the contract provisions, secured by the contractor/subcontractor(s) at his option, are ineligible. The following list of typical direct labor charges is provided for your assistance and is in no way intended to be complete or all encompassing:

- Workman's Compensation
- Federal/State: Social Security Tax and Unemployment Tax;
- Health, Welfare and Pension Benefits; (this cost is included in the wage rates appearing in the Attachment A Massachusetts Wage Rates.

Liability insurance:	Bodily injury; excess umbrella; property damage; public liability
Blasters insurance:	If applied to any required direct labor costs
Builders risk insurance:	If applied to any required direct labor costs
Experience modification insurance:	If applied to any required direct labor costs
Surcharges:	If applied to any required direct labor costs

Following award and prior to execution of a construction contract, the Contractor and filed sub-bidders (where applicable) shall submit for review by the Owner, documentation to establish the markup percentage(s).

The documented direct labor markup for this contract may be adjusted on an annual basis as measured from the date the contract is executed. The contract agreement will provide for the establishment of the Direct Labor Cost percentage.

3. Material and Freight - Only those materials required as a result of the change order and reasonable freight charges for delivery of same are allowable.

4. Equipment - Only the equipment required as a result of the change order is allowable. Equipment rental rates shall be governed by the current EquipmentWatch, division of Intertec Publishing [Formerly Nielson/Dataquest] Rental Rate Bluebook for Construction Equipment (the "Bluebook"). In determining the rental rate the following shall apply:

- a. For equipment already on the project - the monthly prorated rental rate by the hourly use shall be applicable;
- b. For equipment not on the project the daily rate, the weekly rate, or monthly rate will prevail, whichever will prove to be most cost effective. Small tools and manual equipment are examples of costs not allowable under this item. These costs are considered to be included in the overhead markup as provided in note 5.

(1 Month (Normal Use) = 176 hours)

5. Overhead and Profit - All other costs not previously mentioned are considered to be included in this item, be it for the general contractor or subcontractor(s).
6. Markup on Police and Railroad Personnel – Markup to these expenses are not allowable.
7. Credits - Work deleted, material and equipment removed from the contract, stored and/or returned shall be credited to the cost of the change order, less documented costs.

This change order will be prepared in such manner as to clearly separate Eligible and Ineligible Costs.

The Contractor shall furnish itemized statements of the cost of the work ordered and shall give the Engineer access to all accounts, bills and vouchers relating thereto; and unless the Contractor shall furnish such itemized statements, and access to all accounts, bills and vouchers, he shall not be entitled to payment for any items of extra work for which such information is sought by the Engineer.

END OF SECTION

## GENERAL CONDITIONS

1. INFORMATION

All information shall come from the Office of the City Purchasing Agent. The Contractor shall inquire at this office for any information needed. Wherever the words “or equal as approved” are used, it is to be understood that the opinion of the City Purchasing Agent shall govern.

2. SUITS

The Contractor shall assume defense of and shall indemnify and hold the City and its agents harmless from all suits and claims against the City and its sub-contractors arising from the use of any invention, patent right labor or employment, or from any act of omission or neglect of the City, its agents, employees or any subcontractor in performing the work, under this contract.

3. LAWS AND REGULATIONS

The Contractor shall conform to all the applicable rules, regulations, laws and ordinances of the City of Waltham, the Commonwealth of Massachusetts, the United States of America and all agencies having jurisdiction over this contract.

4. PROTECTION OF PROPERTY

The Contractor shall take all proper precautions to protect the City’s property from damage and unnecessary inconvenience. Any City property damaged by the Contractor in carrying out the provisions of this contract shall be restored to its original condition, by and at the expense of the Contractor.

5. PROTECTION OF PERSONS

The Contractor shall take all proper precautions to protect persons from injury, unnecessary inconvenience, and shall be responsible for his failure to do so. The Contractor agrees to hold the City harmless from any and all liabilities of every nature and description, which may be suffered through bodily injury, including death, to any person, by reason of negligence of the Contractor, his agents or employees, or any subcontractor.

6. CONTRACT DURATION.

This contract is for the period required to complete the project but no later than 150 days from the date of the Notice-to-Proceed (NTP).

7. INSURANCE

A. WORKMAN’S COMPENSATION: The Contractor shall provide insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor. Contractors shall provide insurance on a primary basis and the contractor’s policy shall be exhausted before resorting to other policies. The contractor’s policy is the primary one not the contributory.

B. COMPREHENSIVE GENERAL LIABILITY

Bodily Injury:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate
Property Damage:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate

C. AUTOMOBILE (VEHICLE) LIABILITY

Bodily Injury	\$2,000,000 Each Occurrence
Property Damage	\$1,000,000 Aggregate

D. UMBRELLA POLICY

General liability	\$2,000,000
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Your bid response must include a Certificate of Insurance with the above limits as a minimum. In addition, the Certificate of Insurance must have the following text contained in the bottom left box of the Certificate: **“The City of Waltham is a named additional insured for all insurances under the contract, excluding Automobile and Workers Compensation coverage”**. Failure by

the contractor to provide a current and updated insurance policy, during the entire duration of the contract, may result in additional legal liability. The Certificate of Insurance must be mailed directly to:

Office of the Purchasing Agent  
Purchasing Department  
City of Waltham  
610 Main Street  
Waltham, MA 02452

8. LABOR AND MATERIALS BOND

The Contractor agrees to execute and deliver to the City, a Labor and Materials or Payment Bond equal to 50% of the contract value. This contract shall not be in force until said bond has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

A LETTER FROM A SURETY COMPANY CERTIFYING THAT THE CONTRACTOR IS QUALIFIED AND CAPABLE OF OBTAINING THE ABOVE BONDS MUST BE INCLUDED WITH HIS/HERS BID.

9. PERSONNEL:

The Contractor shall employ a competent supervisor and all properly licensed personnel necessary to perform the services required in this contract. The City Purchasing Agent shall have the right to require the Contractor to remove and/or replace any of the personnel for nonperformance or for unprofessional behavior. The City Purchasing Agent may require the Contractor to submit a weekly performance record of the areas and of the work performed, on forms approved by the City Purchasing Agent. The Contractor or his supervisor shall be available to inspect such work as required by the City Purchasing Agent.

10. PREVAILING WAGES

The Contractor is required to pay the prevailing wages as determined under the provisions of Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority.

11. MATERIALS

The City or its Agent reserves the right to approve or reject any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any rejected supplies, materials or equipment, to the satisfaction of the City or its Agents.

12. TERMINATION OF CONTRACT

This contract may be terminated by the City upon deliverance to the Contractor of a five-day written notice of said termination.

13. CONTRACT OBLIGATIONS

Contract obligations on behalf of the City are subject to an annual appropriation to cover the contract obligation.

14. BIDDER EXPERIENCE EVALUATION

Each bidder shall submit with his bid, all the information relative to their experience and qualifications in performing the work required under this contract and shall have been in business for a minimum of five (5) years, in order for their bid to be considered.

15. NOT-TO-EXCEED AMOUNT

The bid amount proposed in your company's response is a "not-to- Exceed" amount unless the City makes changes, in writing, to the scope of work to be performed. The Change Order must be signed and approved by the City's Purchasing Agent, City Auditor, Law Department and the Mayor prior to the commencement of the change order work. No work is to begin until the proper approvals have been obtained. A change order will be priced at the unit price. Failure to



comply with this procedure will result in the cancellation of the contract and the non-payment of services provided

16. FINANCIAL STATEMENTS.

The City may require, within five (5) days after the bid opening, a complete and detailed Financial Statement prepared by a Certified Public Account, to determine a bidder's financial stability.

17. BREACH OF CONTRACT/ NON PERFORMANCE

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be liable for any damages sustained by the City due to the Contractor's failure to furnish services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

18. RIGHT TO AUDIT

The City of Waltham has the right to review and audit documents related to this contract. This right extends to any subcontractor, supplier or other entity used by the prime contractor to fulfill the obligations under this contract.

19. CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

20. ACTIVE REPARATION CLAIMS

Does your company or any of its Principals have an active reparation Claim with the City. A claim is any demand by a contract for the payment of disputed invoices, payment penalties, labor disputes, interest, etc. YES \_\_\_\_\_, NO \_\_\_\_\_ (circle or check applicable).

If YES Please explain the nature of the claim, date of the claim and City Department

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(Add an additional page if necessary)

**COMPLIANCE**

The compliance documents in this section must be completed, signed and returned with your bid package.

Purchasing Department  
City of Waltham  
610 Main Street  
Waltham, MA 02452

Failure to submit the completed documents will cause the disqualification of the proposal.

Section Index

	Check when Complete
• Non-collusion form and Tax Compliance form.....	_____
• Corporation Identification Form.....	_____
• Certificate of Vote Authorization.....	_____
• Certificate of Insurance (showing all limits of WC &GL).....	_____
• Three (3) References.....	_____
• 5% Bid Bond or Certified Check.....	_____
• Debarment Certificate .....	_____
• Prevailing Wage Certificate.....	_____
• Right-to-know Law.....	_____
• OSHA 10 Certificate for all Assigned Employees (MGL ch30, §39M and Ch 149)	_____

Before the commencement of the Job, the contractor must provide to the above office:

- Performance Bond for 50% of the contract value and naming the City of Waltham (letter must be included with your response)

Your Company's Name: \_\_\_\_\_

Service or Product Bid \_\_\_\_\_

NOTE: Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

**NON-COLLUSION FORM AND TAX COMPLIANCE FORM**

**CERTIFICATE OF NON-COLLUSION**

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. The undersigned certifies that no representations made by any City officials, employees, entity, or group of individuals other than the Purchasing Agent of the City of Waltham was relied upon in the making of this bid

\_\_\_\_\_ / \_\_\_\_\_  
Date (Signature of person signing bid or proposal)

\_\_\_\_\_  
(Name of business)

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**TAX COMPLIANCE CERTIFICATION**

Pursuant to M.G.L. c. 62C, & 49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

\_\_\_\_\_/\_\_\_\_\_  
Signature of person submitting bid or proposal Date

\_\_\_\_\_  
Name of business

**NOTE**

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

**CERTIFICATE OF VOTE OF AUTHORIZATION**

Date:

I \_\_\_\_\_, Clerk of \_\_\_\_\_ hereby certify that at a meeting of the Board of Directors of said Corporation duly held on the \_\_\_\_\_ day of \_\_\_\_\_ at which time a quorum was present and voting throughout, the following vote was duly passed and is now in full force and effect:

VOTED: That \_\_\_\_\_ (name) is hereby authorized, directed and empowered for the name and on behalf of this Corporation to sign, seal with the corporate seal, execute, acknowledge and deliver all contracts and other obligations of this Corporation; the execution of any such contract to be valid and binding upon this Corporation for all purposes, and that this vote shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent vote of such directors and a certificate of such later vote attested by the Clerk of this Corporation.

I further certify that \_\_\_\_\_ is duly elected/appointed \_\_\_\_\_ of said corporation

SIGNED:

(Corporate Seal)

\_\_\_\_\_  
Clerk of the Corporation:

Print Name: \_\_\_\_\_

\_\_\_\_\_  
COMMONWEALTH OF MASSACHUSETTS

County of \_\_\_\_\_

Date:

Then personally appeared the above named and acknowledged the foregoing instrument to be their free act and deed before me, \_\_\_\_\_

Notary Public;

My Commission expires: \_\_\_\_\_

**CORPORATION IDENTIFICATION**

The bidder for the information of the Awarding Authority furnishes the following information.

**If a Corporation:**

Incorporated in what state \_\_\_\_\_  
President \_\_\_\_\_  
Treasurer \_\_\_\_\_  
Secretary \_\_\_\_\_  
Federal ID Number \_\_\_\_\_

If a foreign (out of State) Corporation – Are you registered to do business in Massachusetts?

Yes \_\_\_\_\_, No \_\_\_\_\_

If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

**If a Partnership: (Name all partners)**

Name of partner \_\_\_\_\_  
Residence \_\_\_\_\_  
Name of partner \_\_\_\_\_  
Residence \_\_\_\_\_

**If an Individual:**

Name \_\_\_\_\_  
Residence \_\_\_\_\_

**If an Individual doing business under a firm's name:**

Name of Firm \_\_\_\_\_  
Name of Individual \_\_\_\_\_  
Business Address \_\_\_\_\_  
Residence \_\_\_\_\_  
Date \_\_\_\_\_

Name of Bidder \_\_\_\_\_  
By \_\_\_\_\_  
Signature \_\_\_\_\_  
Title \_\_\_\_\_

Business Address \_\_\_\_\_ (POST OFFICE BOX NUMBER NOT ACCEPTABLE)

City State Telephone Number Today's Date

**PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES**

1. Company Name:  
Address:  
Contact Name:  
Phone #  
Type of service/product provided to this Company:  
  
Dollar value of service provided to this Company:

2. Company Name:  
Address:  
Contact Name:  
Phone #  
Type of service/product provided to this Company:  
  
Dollar value of service provided to this Company:

3. Company Name:  
Address:  
Contact Name:  
Phone #  
Type of service/product provided to this Company:  
  
Dollar value of service provided to this Company:

**NOTE**

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

**WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE**

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided, A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit, on a weekly basis, a copy of his or her weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those reports for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work, a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

\_\_\_\_\_

**STATEMENT OF COMPLIANCE**

\_\_\_\_\_, 200\_\_

I \_\_\_\_\_,  
(Name of signatory party) \_\_\_\_\_ (Title)

I do hereby state that I pay or supervise the payment of the persons employed by

\_\_\_\_\_ on the \_\_\_\_\_  
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature \_\_\_\_\_, Title \_\_\_\_\_

Print \_\_\_\_\_

**RIGHT TO KNOW LAW**

Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance, pursuant to M.G.L. c. 111F, §§8,9 and 10 and the regulations contained in 441 CMR 21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. c. 111F §7 and regulations contained in 441 CMR 21.05. Failure to furnish MSDS and/or labels on each container may result in civil or criminal penalties, including bid debarment and action to prevent the vendor from selling said substances, or mixtures containing said substances within the Commonwealth. All vendors furnishing substances or mixtures subject to Chapter 111F or M.G.L. are cautioned to obtain and read the laws, rules and regulations referenced above. Copies may be obtained from the State House Bookstore, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834.

Authorized Signature Indicating Compliance with the Right-to-know laws:

Signature \_\_\_\_\_ Date \_\_\_\_\_

Print Name \_\_\_\_\_

Company \_\_\_\_\_

**NOTE**

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.



**DEBARMENT CERTIFICATION**

In connection with this bid and all procurement transactions, by signature thereon, the respondent certifies that neither the company nor its principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts, procurement or non procurement programs from the Commonwealth of Massachusetts, the US Federal Government and /or the City of Waltham. "Principals" means officers, directors, owners, partners and persons having primary interest, management or supervisory responsibilities with the business entity. Vendors shall provide immediate written notification to the Purchasing Agent of the City of Waltham at any time during the period of the contract or prior to the contract award if the vendor learns of any changed condition with regards to the debarment of the company or its officers. This certification is a material representation of fact upon which reliance will be placed when making the business award. If at any time it is determined that the vendor knowingly misrepresented this certification, in addition to other legal remedies available to the city of Waltham, the contract will be cancelled and the award revoked.

Company Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_, State \_\_\_\_\_, Zip Code \_\_\_\_\_

Phone Number (\_\_\_\_) \_\_\_\_\_

E-Mail Address \_\_\_\_\_

Signed by Authorized Company Representative:

\_\_\_\_\_

Print name \_\_\_\_\_,

Date \_\_\_\_\_

**Subcontractor's Certification**

Prior to the award of any subcontract, regardless of tier, the prospective subcontractor must execute and submit to the General Contractor for the following certification, which will be deemed a part of the resulting subcontract:

SUBCONTRACTOR'S CERTIFICATION

\_\_\_\_\_ Name of Subcontractor & Trade

certifies that:

- 1. It intends to use the following listed construction trades in the work under the contract:

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

- 2. Will comply with the minority workforce ratio and specific affirmative action steps contained herein; and

- 2. Will obtain from each of its subcontractors prior to the award of any subcontract under this contract the subcontractor's certification required by these bid conditions.

Signature of Authorized Representative of Subcontractor \_\_\_\_\_

Print name \_\_\_\_\_

**10 HOURS OSHA TRAINING CONFIRMATION**

Chapter 306 of the Acts of 2004  
CONSTRUCTION PROJECTS  
AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

The undersigned hereby certifies that all employees to be employed at a worksite for construction, reconstruction, alteration, remodeling, repair, installation, demolition, maintenance or repair of any public work or any public building estimated to cost more than \$10,000.00 have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first payroll report for each employee and will comply with all laws and regulations applicable to awards of subcontracts subject to section 44F.

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Print Name \_\_\_\_\_

Date: \_\_\_\_\_

See Chapter 306 of the Acts of 2004

**NOTE**

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company

\*\*\* END OF SECTION \*\*\*

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SECTION 00300

FORM FOR GENERAL BID

CITY OF WALTHAM, MASSACHUSETTS  
WATER MAIN IMPROVEMENTS

The following Bid is submitted to: City of Waltham Purchasing Department .  
Attn: Joseph Pedulla, Chief Procurement Officer  
Waltham City Hall .  
610 Main Street  
Waltham, Massachusetts 02452 .

By (Contractor Name): \_\_\_\_\_ .  
(Address for Giving Notice): \_\_\_\_\_ .  
\_\_\_\_\_  
\_\_\_\_\_  
(Telephone): \_\_\_\_\_ .  
(FAX): \_\_\_\_\_ .

A. The Undersigned proposes to furnish all labor and materials required for Water Main Improvements Project in Waltham, Massachusetts, in accordance with the accompanying plans and specifications prepared by Wright-Pierce for the contract price specified below, subject to additions and deductions according to the terms of the specifications.

B. This bid includes addenda

Number \_\_\_\_\_  
Dated \_\_\_\_\_

C. The proposed contract price for the Base Bid including Bid Items 1 through 21 complete is

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ dollars (\$ \_\_\_\_\_).  
(in Words) (in Figures)

D. The subdivision of the proposed contract price is as follows:

Item No.	Quantity*	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
1	1 LS	Mobilization (Maximum 5% of total Bid) The Sum of \$ _____ _____	\$ _____	\$ _____
Per Lump Sum				
2A	1,300 LF	12-inch Ductile Iron Water Main The Sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot				
2B	2,700 LF	8-inch Ductile Iron Water Main The Sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot				
2C	200 LF	6-inch Ductile Iron Water Main The Sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot				
2D	75 LF	4-inch Ductile Iron Water Main The Sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot				
3	7,500 LBS	Ductile Iron Fittings and Couplings The Sum of \$ _____ _____	\$ _____	\$ _____
Per Pound				
4A	19 EA	12-inch Gate Valves The Sum of \$ _____ _____	\$ _____	\$ _____
Per Each				

Item No.	Quantity*	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
4B	28 EA	8-inch diameter Gate Valves The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Each		
5	10 EA	Hydrant Assemblies The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Each		
6A	100 EA	1-inch Corporation Stops The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Each		
6B	6 EA	2-inch Corporation Stops The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Each		
6C	100 EA	1-inch Curb Stop The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Each		
6D	6 EA	2-inch Curb Stop The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Each		
6E	2,000 LF	1-inch Type K Copper Tubing The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Linear Feet		
6F	100 LF	2-inch Type K Copper Tubing The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Linear Feet		
7	600 LF	4-inch PVC Sewer Services The Sum of \$ _____ _____	\$ _____	\$ _____
		Per Linear Feet		



Item No.	Quantity*	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
8	100 LF	Removing/Relaying Existing Utilities The Sum of \$ _____ _____	\$ _____	\$ _____
Per LF				
9	25 CY	Ledge Excavation The Sum of \$ _____ _____	\$ _____	\$ _____
Per Cubic Yard				
10	100 CY	Excavation Below Trench Grade and Replacement Backfill The Sum of \$ _____ _____	\$ _____	\$ _____
Per Cubic Yard				
11	250 CY	Replacement of Unsuitable Material above Trench Grade The Sum of \$ _____ _____	\$ _____	\$ _____
Per Cubic Yard				
12A	850 TN	Permanent Binder Course The Sum of \$ _____ _____	\$ _____	\$ _____
Per Ton				
12B	450 TN	Permanent Top Course The Sum of \$ _____ _____	\$ _____	\$ _____
Per Ton				
13	180 LF	Remove and Reset Curb The Sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot				
14	55 TN	Repair Bituminous Sidewalks and Curbs The Sum of \$ _____ _____	\$ _____	\$ _____
Per Ton				

Item No.	Quantity*	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
15	1 LS	Erosion and Sedimentation Control The Sum of \$ _____ _____	\$ _____	\$ _____
Per Lump Sum				
16	1 LS	Temporary Water Bypass The Sum of \$ _____ _____	\$ _____	\$ _____
Per Lump Sum				
17	10 EA	Test Pit Excavation The Sum of \$ _____ _____	\$ _____	\$ _____
Per Each				
18	1 LS	Utility Coordination The Sum of \$ _____ _____	\$ _____	\$ _____
Per Lump Sum				
19	Allowance	Uniformed Police Detail The Sum of \$ _____ _____	<u>\$151,000.00</u>	<u>\$151,000.00</u>
Allowance				
20	Allowance	Price Adjustment Allowance The Sum of \$ _____ _____	<u>\$7,500.00</u>	<u>\$7,500.00</u>
Allowance				
21	Allowance	Utility Repairs The Sum of \$ _____ _____	<u>\$40,000.00</u>	<u>\$40,000.00</u>
Allowance				

\* Indeterminate quantities assumed for comparison of bids. Quantities are not guaranteed. Payment will be based on actual quantities installed/constructed.

E. The undersigned agrees that, if selected as general contractor, he/she will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority and each in the sum of the contract price, the premiums for which are to be paid by the general contractor and are included in the contract price.

The undersigned declares that the only persons or parties interested in this Bid as principals are as

stated; that the Bid is made without any collusion with other persons, firms, or corporations; that all, the Contract Documents as prepared by Wright-Pierce, 40 Shattuck Road, Suite 305, Andover, MA 01810 and dated APRIL 2014 have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in performing the Work required under the Contract Documents, of which this Bid Form is a part.

The time period for holding bids, where Federal approval is not required is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids.

The Bid Security accompanying this Bid shall be in the amount of 5 percent of the Bid. The Bid Security shall be sealed in a separate envelope from the Bid and then attached to the envelope containing the Bid.

If a Notice of Award accompanied by at least six unsigned copies of the Agreement and all other applicable Contract Documents is delivered to the undersigned within thirty days, excluding Saturdays, Sundays, and legal holidays after the actual date of the opening of the General Bids, the undersigned will within five days, excluding Saturdays, Sundays, and legal holidays, after the date of receipt of such notification, execute and return all copies of the Agreement and all other applicable Contract Documents to OWNER. The premiums for all Bonds required shall be paid by CONTRACTOR and shall be included in the Contract Price. The undersigned Bidder further agrees that the Bid Security accompanying this Bid shall become the property of OWNER if the Bidder fails to execute the Agreement as stated above.

The undersigned hereby agrees that the Contract Time shall commence twenty days following the Effective Date of the Agreement and that the Work will be substantially complete and completed and ready for final payment in accordance with paragraph 14.07 of the General and Supplementary Conditions on or before the dates or within the number of calendar days indicated in the Agreement. Work will be substantially complete within **150** calendar days after the date of the Notice to Proceed. The undersigned further understands that delays in completion of the Work will cause the OWNER to suffer damages and incur substantial costs, and will expose the OWNER to other substantial liabilities, and that if the selected Contractor shall neglect, fail or refuse to achieve Substantial Completion or final completion of the Work within the times specified above, as such times may be extended pursuant to the provisions of the Contract Documents, the OWNER will hold the selected Contractor strictly liable for all such damages and any other damages, costs, expenses or liabilities sustained or incurred by the OWNER arising out of such delays, as further provided in the Agreement, or for any delay in achieving any other milestones set forth in the Contract Documents in accordance with the terms of the Agreement. The undersigned accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time in the amount of **\$1,000** per day after substantial completion time limits.

In accordance with the above understanding, the undersigned proposes to perform the Work, furnish all materials and complete the work in its entirety in the manner and under the conditions required.

The OWNER shall select the low responsive and responsible bidder based on the Base Bid and available funding.

The undersigned agrees that extra work, if any, will be performed in accordance with Article 10 of the General Conditions of the Contract and will be paid for in accordance with Article 16 of the General

Conditions of the Contract.

The bidding and award of this Contract will be in accordance with M.G.L. Chapter 30, Section 39M.

The undersigned must furnish a 100 percent Performance Bond and a 100 percent Payment Bond with a surety company acceptable to OWNER.

Where indicated for amounts to be shown in both words and figures, in case of discrepancy, the amount shown in words shall govern.

**CERTIFICATIONS**

Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

The undersigned hereby certifies that he/she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he/she will comply fully with all laws and regulations.

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-nine F of Chapter Twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

\_\_\_\_\_  
Social Security Number or  
Federal Identification Number

\_\_\_\_\_  
Individual or Corporate Name  
(Print or Type)

For Certifications By: \_\_\_\_\_  
(Signature of Authorized Person)

**Signatures for Joint Ventures**

For Certifications By: \_\_\_\_\_  
(Signature of Authorized Person)

For Certifications By: \_\_\_\_\_  
(Signature of Authorized Person)

SECTION 01010SUMMARY OF WORKPART 1 – GENERAL1.1 DESCRIPTION OF WORK

- A. The purpose of this Contract is to replace water mains and/or water services in Willard Street, Plympton Street, Oak Street and Cedar Street in the City of Waltham, Massachusetts. The project requires all work necessary or incidental to this purpose including providing all necessary supervisors, personnel, equipment and materials.
- B. The Contractor shall comply with all applicable performance and safety requirements specifically related to the work under this Contract. In addition, all things not expressly mentioned in these Specifications but involved in carrying out their intent are required by these Specifications, and the Contractor shall perform the same as though they were specifically delineated and described.
- C. It is the Contractor's responsibility to verify physical conditions and components of the work at each specific location of Work.
- D. Work performed under this contract is located on property owned by the City of Waltham, Massachusetts.

1.2 VISITS TO THE SITE

Before submitting a bid, the Contractor shall visit the various sites, examine their conditions and thoroughly acquaint himself with the conditions for performing the work. He shall also study the drawings and compare the same with the information gathered during his examination of the sites, as no extra compensation will be authorized for extra work caused by his unfamiliarity with the sites and/or drawings or the conditions peculiar to this job.

1.3 PERSONNEL REQUIREMENTS

- A. The Contractor (and any subcontractor) shall furnish sufficiently trained and competent personnel to perform the Work required of the Contractor under this Contract.
- B. The Contractor shall provide adequate contract orientation for all staff to be assigned on a permanent, temporary, or call-in basis. This shall include familiarization of equipment type and the respective locations of work. All staff involved in executing this Contract should be familiar with their contractual responsibilities pertaining to security, safety, inspection guidelines, and activities around all work locations.
- C. If any Contractor's personnel is deemed unsatisfactory or does not perform the services to be furnished hereunder in a proper manner and satisfactory to the City, or in the determination of the City has taken action which constitutes a conflict of interest or which is inconsistent with the highest level of honesty, ethical conduct or public trust or which the City determines is adverse to the public interest or to the best interest of the City, the Contractor shall remove any such personnel and replace them with personnel satisfactory to the City within twenty-four (24) hours following the Contractor's receipt of a request for such replacement.

1.4 PERMITS, FEES AND BONDS

- A. The Contractor shall obtain and comply with all required permits, all fees are waved. Provide all bonds necessary to complete the work as specified.
- B. A City of Waltham Water Connection Permit must be issued before work is started.

1.5 FIELD LAYOUT

The Engineer shall be responsible for the initial layout of control (if required). The Contractor shall be responsible for layout of the proposed work and appurtenances as shown on the drawings. Site and grading adjustments may be made in the field, subject to review and approval by the Engineer.

1.6 SAFETY

The Contractor shall be responsible for compliance with all applicable regulations of OSHA.

1.7 TRAFFIC DETOURS AND ROAD ACCESSIBILITY

- A. Traffic Management Plan - The Contractor shall prepare, and submit a plan that shows the routing of traffic during construction. The plan shall show the area and dimensions of the roadway pavement available for traffic during each stage of the work. The plan shall include all temporary barriers, signs, pavement markings, drums and other traffic control devices required to maintain traffic together with the limits of temporary pavement and necessary steel plates. The plan shall include all the requirements contained in the City of Waltham Policy on Street Opening Permits.
- B. The Contractor shall contact the responsible heads of the Fire, Police, Highway, Sewer, School and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic control, alternate vehicular access routes, etc. Wherever detours are permitted the size, construction and location of signs shall conform to local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to his route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.
- C. When Work is performed along roadways, all operations shall be planned so as to cause minimum interference with traffic and with maximum precautions at all times.
- D. The Contractor shall have due regard to the location of detours and to the provisions for handling traffic, and shall not open up Work to the prejudice or detriment of Work already started. When it is required under the Contract that traffic be detoured around the Work, the Contractor shall provide and maintain suitable detours in accordance with the Contract Documents, and as approved by the City.
- E. The Contractor shall be responsible for the maintenance of traffic over, through or around the Work during the life of the Contract, and whether or not work thereon has been suspended temporarily. The Contractor shall take all precautions for preventing injuries to persons or damage to property in or about the Work. The Contractor shall provide and maintain temporary bypasses as may be necessary to accommodate traffic on the roadway under construction or repair.
- F. All Work sites and adjacent areas shall be adequately protected. Roadways shall be closed to traffic only as approved by the City. Whenever the closing of any lane is permitted by the City, the Contractor shall comply with all pertinent provisions of the

## Contract Documents.

- G. All personnel shall observe safety rules and regulations and shall wear suitable safety equipment, at all times. Personnel who disregard safety regulations will be barred from the Work by the City and the Contractor shall be without recourse.
- H. All vehicles and construction equipment shall be properly registered and comply with the City's Rules and Regulations. All vehicles shall be equipped with such safety devices as flags, markings, beacons, strobes, and lights, in good working order. No separate compensation will be allowed for this work or equipment.
- I. At the end of each work day, the Contractor shall remove its equipment from the roadway, and if applicable, shall store such equipment in areas as approved by the City. No equipment shall be stored on the roadway during non-work periods. Construction or repair materials shall not be stored on the roadway except as approved by the City.

1.8 PUBLIC SAFETY - POLICE DETAILS AND FLAGGERS

- A. In general, local police details or certified traffic flaggers will be required on all local streets for public safety and for maintaining two-way traffic during construction.
- B. The use of police details or flaggers shall be at the sole discretion of the City. The need for uniformed police officers will be made by the City prior to the start of work.
- C. Flaggers will be used in accordance with Mass regulation 701 CMR 7.00.

1.9 HOURS of WORK

- A. No work shall be started before 7:00 A.M. and no work shall be performed on restricted roads between the hours of 7:00 A.M. and 9:00 A.M. and between 4:00 P.M. and 6:00 P.M. Also, no construction vehicles shall be parked waiting to perform work during these hours on restricted roads.

The following roads located within the project limits of work are classified as restricted roads:

1. Bacon Street
2. Newton Street
3. High Street

- B. No work shall be done on Saturday or Sunday or Holidays observed by the City of Waltham.
- C. **All work completed on Thursday, July 3, 2014 is to be completed by 12:00 PM. These hours include time for clean-up and restoration of the roads to normal traffic flow.**
- D. All work shall be completed by the time stipulated by the City. **These hours include the time for clean-up of the site and restoration of the roads to normal traffic flow.**
- E. The work areas are located in close proximity to private homes. The Contractor will need to pay particular attention to noise generation during early and late times of day, traffic flow, erosion control and dust generation to abutting properties, and the removal of soils, placement of stockpiles, etc. in order to maintain access through the work area. Any detours, if required, must be arranged through the local Police and Fire Departments and the Massachusetts Department of Transportation.



1.10 SCHEDULE

- A. Prior to beginning operations, the Contractor shall submit a schedule of the proposed work for review and approval. The schedule shall show the work broken down into logical and specifically executable tasks necessary to meet the completion date.
- B. All tasks shall include estimated time duration and be shown on a timeline type chart. In addition, tasks shall be depicted in terms of their relationship to tasks before and after.
- C. The schedule shall be developed in Microsoft Project format or other approved schedule software and shall be submitted in either electronic or hardcopy form.
- D. The schedule shall be updated bi-monthly and updated more frequently whenever the project schedule changes. In addition, the schedule shall be submitted with the monthly payment requisition.
- E. The Contractor may deviate from the above sequence provided he can demonstrate to the Engineer that the continuity of the project will not be adversely affected.

1.11 DIG SAFE

Prior to commencing excavation work, the Contractor shall notify Dig-Safe (1-800-322-4844) to have all existing public and private utility lines and underground structures marked out.

1.12 OPERATION OF EXISTING WATER INFRASTRUCTURE

The Contractor shall not operate any hydrants, valves, curb stops or corporations, nor shall they draw any water from the system without specific approval of the City of Waltham Engineering Department. Only City personnel will operate valves, hydrants corporations and curb stops unless otherwise directed by the City. Should operation of such items be necessary, the Contractor shall contact the City a minimum of 48 hours in advance of such facility to coordinate this work.

1.13 HANDLING OF ASBESTOS PRODUCTS

If the Contractor should encounter asbestos products during construction, the Contractor shall conform with all applicable provisions of OSHA, Federal, State and Local Regulations regarding the handling and/or disposing of asbestos products.

1.14 SOILS MANAGEMENT PLAN

- A. The Contractor shall prepare and submit prior to the start of work, a SOILS MANAGEMENT PLAN detailing the contractors procedures for handling suitable and unsuitable materials transported to and from the work area(s).
  - 1. At a minimum, the plan is to include:
    - a. Sampling requirements
    - c. Requirements for handling soil with no analyte concentrations detected
    - d. Analyte concentrations detected between laboratory detection limits and reportable limits
    - e. Concentrations above reportable limits.
  - 2. Soil Management plan shall be signed by a Massachusetts Licensed Site Professional.
- B. All surplus unsuitable material removed from the excavations shall remain the property of the Contractor and shall be properly disposed by the Contractor with approval by the ENGINEER. The Contractor is responsible for the disposal fees for the deposition of all waste, unsuitable and hazardous materials from the work

performed.

- C. All surplus suitable material removed from the excavations may be incorporated into the project upon approval. Surplus suitable material not used in the work, is the responsibility of the Contractor including disposal fees.

1.15 REMOVALS, RELOCATIONS AND REARRANGEMENTS

- A. Examine the existing site for the work of all trades which will influence the cost of the work under the general bid. This work shall include removals, relocations and rearrangements which may interfere with, disturb or complicate the performance of the work under the general bid involving systems, equipment and related service lines, which shall continue to be utilized as part of the finished project. The Contractor is responsible for all coordination in this regard.
- B. Include all removals, relocations, rearrangements and reconnections herein specified, necessary or required to provide approved operation and coordination of the combined new and existing systems and equipment.

1.16 RESTORATION OF DISTURBED AREAS

The Contractor is responsible for the restoration of all areas disturbed by the work to an equal or better condition than that encountered prior to construction. This requirement is especially important to the City and will be enforced.

1.17 EXISTING UTILITIES, MAINTAINING SERVICE AND ACCESS

- A. The Contractor is advised that protection of the existing utilities in the vicinity of the project, and the assurance of uninterrupted service during the contract period is of the essence. Existing utilities must remain in service throughout the entire project, except in the case of tying in services and/or making connections to existing equipment. This is particularly critical in the case of cutting over existing utilities.
- B. Interruptions in service will be allowed only during scheduled shutdowns approved in advance.
- C. The location and size of some existing underground facilities such as sewers, drains, culverts, water mains, gas mains, cables, service pipes, etc., are shown on the plans, based on results of surveys and existing records, and are shown as approximate only. The plans do not show the exact location and depth of all utilities, nor do they show all utilities that may be encountered.
- D. The Contractor shall assume that there are existing underground utility connections to each and every building or structure along the line of work, whether they appear on the drawings or not. The Contractor shall notify the proper utility companies and obtain and preserve the locations as marked for all existing gas, electric and other utilities that may be encountered along the line of work, until such time as such markings are no longer required.
- E. Experimental trench excavations are to be made prior to commencing pipe laying operations. The experimental trench locations shall be where requested by the Contractor and/or as directed by the Engineer, and shall be paid for under the applicable bid item.
- F. The Contractor shall dig by hand in advance of the trenching machinery to determine the exact location and depth of each utility to be encountered. Excavating machinery shall be stopped at least two feet away from each side of the utility to be crossed and the Contractor shall tunnel by hand under these utilities after he has ascertained their exact location and depth.

- G. The use of steel plates will be permitted by the City. Should the Contractor choose to use steel plates to cover trenches during the daytime or at night, the plates must be keyed into the surrounding pavement and the edges secured with spikes.

1.18 BLASTING

In the event that blasting or other operations undertaken by the Contractor under this contract result in damages to, all necessary repairs to water piping, valves, hydrants, fittings, cables, etc., shall be done by the Contractor. The Contractor shall provide, at no extra cost to the Owner, all necessary materials, equipment and labor necessary to satisfactorily excavate backfill, repair, etc., in conjunction with such repair work.

1.19 TRASH REMOVAL

- A. The Contractor shall arrange to dispose of all liquid and solid refuse in a lawful, safe and efficient and anti-pollutant manner subject to the prior approval of the City.
- B. The Contractor shall remove daily from the Location(s) of Work by means provided by the Contractor, all garbage, debris, and other waste materials (whether solid or liquid) arising out of or in connection with its operations hereunder, and any such garbage, debris and other waste materials not immediately removed shall be temporarily stored in a clean and sanitary condition, approved by the City, in suitable garbage and waste receptacles, also approved by the City and shall be kept covered except when filling and emptying them.
- C. The Contractor shall exercise care in removing such garbage, debris and other waste materials from the Location(s) of Work. The manner of such storage and removal shall always be subject in all respects to the continual approval of the City. No equipment or facilities of the City shall be used in such removal unless prior written consent is given by the City. No such garbage, debris, or other waste materials shall be or be permitted to be thrown, discharged or disposed into or upon waters or bounding the Location(s) of Work.

1.20 CHANGES IN AMOUNT OF WORK

The Owner reserves the right to increase or decrease the amount of any item of the work listed as may be found desirable or necessary during the carrying out of this contract and the unit prices quoted in the Proposal shall apply without change to such variation in the quantity of each of the Items.

1.21 SEQUENCE OF CONSTRUCTION

- A. For the protection of life and property all backfill operations shall follow closely behind pipe laying. The Contractor shall insure that no excavation be left open, unguarded, or water filled during any period of time when work is not actually in progress. It is the purpose and intent that all excavations and backfill, including consolidation operations, the installation of service connections and temporary surfacing and pavements within an area be accomplished expeditiously before proceeding to other work areas. Construction scheduling and methods will be discussed at the pre-construction conference.
- B. The Owner reserves the right to schedule the Contractor to construct at any locations within the project area. At the same time the Owner may order the suspension of construction at any location. Construction in seasonally heavily traveled roads shall be avoided during the peak traffic periods.
- C. Staging of water main piping and appurtenances outside of the trench prior to

installation may be required while working within heavily traveled intersections in order to minimize traffic disruptions and maintain emergency vehicle access, particularly at the intersections of Cedar St. & Oak St.; and Oak St. & Newton St.

1.22 PROGRESS OF WORK

The Contractor shall promptly start pipe installation and continue actual construction work under this contract with the necessary crews and equipment to properly execute and complete this contract in the specified time. No cessation of Contractor's operations will be allowed without the approval of the Owner. The rate of progress shall be satisfactory to the Owner.

1.23 TECHNICAL SPECIFICATIONS

All technical specifications such as ASTM, AWWA, AASHTO, etc, referred to in these specifications refer to the latest revision of such technical specifications.

1.24 STATE AND LOCAL HIGHWAY BOUNDS AND PROPERTY MARKERS

When encountered, the Contractor shall engage a Professional Land Surveyor to provide permanent reference points for all bounds and private property markers along the line of the work, which in the opinion of the Engineer, may be disturbed during construction. The Contractor shall submit copies of all ties to the bounds and property markers to the Engineer prior to excavation at the site. Any bounds or markers disturbed by the Contractor shall be replaced utilizing the services of a Professional Land Surveyor. The cost of replacing markers negligently disturbed shall be at the Contractor's expense.

1.25 TWENTY-FOUR (24) HOUR EMERGENCY SERVICE

A. The Contractor shall maintain a 24-hour, 7-day a week telephone service and a local facility to handle emergency requirements such as settled trenches, clogged drains, rain damage, etc. The Contractor's emergency personnel shall be able to respond to emergency calls within thirty minutes. A list of the personnel and their telephone numbers shall be submitted to the Engineer and Owner. This requirement shall apply during the entire length of the project.

B. This list shall be submitted on the Contractor's letterhead and shall state that should an emergency arise during the implementation of this project, these people are to be contacted. The Contractor shall submit this letter at the Pre-Construction Conference.

1.26 CONTRACTORS LAYDOWN/STORAGE

The Contractor is responsible for securing property for his operations including storage of materials and equipment.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Utility location and coordination shall be the responsibility of the Contractor. Dig Safe shall be contacted prior to the layout or excavation of any work.

B. The Contractor shall coordinate his schedule such that construction does not affect

local school bus schedules. If it is expected that a construction event may impact the ability of the school bus to maintain their schedule, the Contractor shall notify the School Department 48 hours prior to the event.

- C. The Contractor shall contact the responsible heads of the Fire, Police, and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic control, alternate vehicular access routes, and other requirements. Wherever detours are permitted, traffic plans, procedures and signage shall conform with local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to the primary route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.

### 3.2 WORK CONDITIONS

Contractor shall utilize extreme care to prevent any contamination when working in proximity to natural water bodies. No oil, fuel, solvents, chemicals, or other type of potential liquid contaminants shall be stored on site. All equipment shall be checked daily for any type of fluid leak. Contractor shall immediately notify Owner and Engineer of any type of leak or spill. Contractor shall take all necessary measures to contain and clean up any type of leak or spill.

### 3.3 MAINTAIN EXISTING WORKS

#### A. Maintain Flows:

1. The responsibility of the Contractor shall be to provide, maintain and operate all temporary facilities required to maintain existing water service such as pumping equipment, piping, and all other labor and equipment necessary to maintain flows.
2. The Contractor shall submit all applicable water bypass documentation to the Engineer a minimum of five (5) business days prior to the required approval of bypass plans.

#### B. Minimize Interference

1. The Contractor shall at all times conduct his operations so as to interfere as little as possible with existing works. The Contractor shall develop a program, in cooperation with the Owner, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations there-from are expressly permitted.
2. Work of connecting with, cutting into and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time and when the demands on the facilities best permit such interference. It may be necessary to work outside of normal working hours to minimize interference. Before starting work which will interfere with the operation of existing facilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.

END OF SECTION

SECTION 01050COORDINATIONPART 1 - GENERAL1.1 DESCRIPTION

- A. Contractor is required to work in close proximity to Owner's existing facilities. The Contractor, under this Contract, will be responsible for coordinating construction activities with Owner to ensure that services, facilities, and safe working conditions are maintained.
- B. The Contractor shall coordinate construction under this Contract with homeowners, utilities and roadway owners.
- C. Any damage to existing structures, equipment and property, accepted equipment or structures, and property or work in progress by others; as a result of the Contractor's or his subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.
- D. All work shall be in accordance with the Standards of the City of Waltham, Massachusetts and shall meet all state and local standards.
- E. A minimum of 48 hours advanced notice is required for all coordination.

1.2 COORDINATION WITH OTHERS

- A. City of Waltham:
  - 1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the City of Waltham Police Department. The Contractor shall notify Waltham Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours.
  - 2. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
  - 3. The Contractor shall not operate any hydrants, valves, curb stops and corporations without specific approval of the City of Waltham Engineering Department.
- B. Waltham Department of Public Works (WDPW)
  - 1. Contractor shall be responsible for coordinating all work in the vicinity of water lines, sewer lines and drain lines with the Waltham Department of Public Works. Contractor shall bear all costs for the WDPW's inspection requirements, temporary facilities, utility adjustments and other requirements.
- C. NStar Electric:
  - 1. The Contractor shall be responsible for coordinating and providing power to all construction sites both temporary and permanent services. The Contractor shall be responsible for coordinating all work in and around NStar facilities with NStar and bear all costs for NStar inspection, temporary facilities relocation and all other requirements.
- D. National Grid Gas:
  - 1. The Contractor shall be responsible for coordinating all work around gas mains and gas services with National Grid Gas. The Contractor shall bear all costs for National Grid inspection, temporary facilities relocation and all other requirements.

- E. Other Public Services:
1. The Contractor shall be responsible for coordinating and maintaining public services to all properties.

END OF SECTION

SECTION 01070ABBREVIATIONS & SYMBOLSPART 1 - GENERAL1.1 DESCRIPTION

A. Where any of the following abbreviations are used in these Specifications, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
AGA	American Gas Association
AIC	Ampere Interrupting Capacity
AGMA	American Gear Manufacturers Association
AIEE(IEEE)	American Institute of Electrical Engineers (Institute of Electrical and Electronics Engineers, Inc.)
AISC	American Institute of Steel Construction
amp	Ampere 125-16
Amer. Std.	American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (ASA B16 11960)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWWA	American Water Works Association
BOD	Biochemical Oxygen Demand
c.f.	Cubic Foot
c.f.m.	Cubic Foot Per Minute
c.f.s.	Cubic Foot Per Second
CI	Cast Iron
CIPRA	Cast Iron Pipe Research Association
CSI	Construction Specifications Institute
c.y.	Cubic Yards
DC	Direct Current
DEP	Department of Environmental Protection
DI	Ductile Iron
DOT	Department of Transportation
EDR	Equivalent Directional Radiation
EPA	U.S. Environmental Protection Agency



fps	Feet Per Second
ft.	Feet
gal.	Gallons
gpd	Gallons Per Day
gpm	Gallons Per Minute
HP	Horsepower
IBR	Institute of Boiler and Radiator Manufacturers
in.	Inches
inter.	Interlock
ISA	Instrument Society of America
kva	Kilovolt-ampere
kw	Kilowatt
lb.	Pound
max.	Maximum
MCB	Master Car Builders
MGD	Million Gallons Per Day
Min.	Minimum
NBS	National Bureau of Standards
NEC	National Electrical Code, Latest Edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NPT	National Pipe Thread
OS&Y	Outside Screw and Yoke
PCA	Portland Cement Association
ppm	Parts Per Million
%	Percent
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
rpm	Revolutions Per Minute
RUS	Rural Utility Service
s.f.	Square Foot
STL. W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
s.y.	Square yard
TDH	Total Dynamic Head
USAS	Standards of the United States of America Standards Institute (formerly American Standards Association)
USS GAGE	United States Standard Gage
VC	Vitrified Clay
WSP	Working Steam Pressure
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. For lump sum items, payment shall be made to the contractor in accordance with an accepted progress schedule and schedule of values on the basis of actual work completed.
- B. For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by final measurements.
  - 1. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
  - 2. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Resident Project Representative and determine the quantities of unit price work accomplished and/or completed during the work day.
  - 3. The Resident Project Representative will then prepare two "Daily Progress Reports" which shall be signed by both the Resident Project Representative and Contractor's Representative.
  - 4. Once each month the Resident Project Representative will prepare two "Monthly Progress Summation" forms from the month's accumulation of "Daily Progress Reports" which shall also be signed by both the Resident Project Representative and Contractor's Representative.
  - 5. These completed forms will provide the basis of the Engineer's monthly quantity estimate upon which payment will be made. Items not appearing on both the Daily Progress Reports and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.
  - 6. After the work is completed and before final payment is made, the Engineer will make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

1.2 SCOPE OF PAYMENT

- A. Payments to the Contractor will be made for the actual quantities of the Contract items performed and accepted in accordance with the Contract Documents. Upon completion of construction, if these actual quantities show either an increase or decrease from the quantities given in the Proposal Form, the Contract Unit Prices will still prevail.
- B. The Contractor shall accept in compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced by the Contract; also for all loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work and until its final acceptance by the

Engineer, and for all risks of every description connected with the prosecution of the work, except as provided herein, also for all expenses incurred in consequence of the suspension of the Work as herein authorized.

- C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

- A. When alterations in the quantities of work not requiring supplemental agreements, as hereinbefore provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

1.4 OMITTED ITEMS

- A. Should any items contained in the bid form be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.5 PARTIAL PAYMENTS

Partial payments shall be made monthly as the work progresses. Partial payments shall be made subject to the provisions of the Supplemental and General Conditions.

1.6 PAYMENT FOR MATERIAL DELIVERED

- A. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into bid items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Owner. Payment shall be subject to the provisions of the General and Supplemental Conditions.
- B. No payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of the Contract.

1.7 FINAL PAYMENT

- A. The Engineer will make, as soon as practicable after the entire completion of the project, a final quantity invoice of the amount of the Work performed and the value of such Work. Owner shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

1.8 INCIDENTAL WORK

- A. Incidental work items for which separate payment will not be made includes, but is not limited to, the following items:
1. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications, and other submittals required by the Contract Documents.
  2. Permits not otherwise paid for or provided by the Owner.
  3. Test pits to determine existing utility locations, soils conditions, and as required to complete the project.
  4. Clearing, grubbing, and stripping.
  5. Visits to the Project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
  6. Preconstruction Photos and Videos.
  7. Coordination with the Owner, Utilities and others, including related inspection cost (refer to Section 01050)
  8. Earthwork (except ledge)
  9. Dust control. Contractor shall have watering equipment on site for the duration of the construction. Watering shall take a place a minimum of two times per day or at the direction of the Engineer.
  10. Dewatering and disposal
  11. Removal and disposal of existing piping (except asbestos) and unsuitable materials.
  12. Temporary utilities for construction and to maintain existing service during construction, payment is otherwise made.
  13. Temporary construction and other facilities not to be permanently incorporated into the Work necessary for construction sequencing and maintenance of operations.
  14. Steel and/or wood sheeting as required, including that left in place
  15. Materials testing
  16. Quality assurance testing
  17. Utility crossings and relocations, unless payment is otherwise made
  18. Traffic Regulation except uniformed police detail and Certified Flaggers.
  19. On-site and other facilities acceptable to Engineer for the storage of materials, supplies and equipment to be incorporated into the Work
  20. Pipe Markings
  21. Utility crossings and relocations, unless payment is otherwise made.
  22. Engineer's Temporary Field Office.
  23. Weather protection, winter construction equipment and fuel.
  24. Restoration of property, and replacement of fences, curbs, structures and other minor items disturbed by the construction activities.
  25. Repair and replacement of utilities damaged by construction activities and corresponding proper disposal of removed materials.
  26. Clean-up.
  27. Loam and seeding.
  28. Potable water for cleaning, disinfection and testing.
  29. Facilities start-up services required by the Contract Documents.
  30. Construction Administration and Insurance.
  31. GPS location of all structures

- 32. Demobilization
- 33. Project record documents.
- 34. Rebuilding/reconstruction/modification of tables and inverts where new sewer is constructed into an existing sewer.

1.9 DESCRIPTION OF PAY ITEMS

- A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid Form.
- B. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the work completed.

Item No. 1 - Mobilization

Payment of the lump sum amount for Item No.1 in the Bid Schedule shall be full compensation for mobilization costs. The amount bid for Item No. 1 shall not exceed 5% of the sum of all other bid items.

Items No. 2 - Furnish and Install Ductile Iron Water Mains

- A. Method of Measurement: Water main measured for payment shall be the actual length in feet as measured along the center line of the pipe as laid including all fittings and valves.
- B. Basis of Payment:
  - 1. Water main shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all pipes, and other materials required for the installation of the pipelines; for clearing and grubbing; for cutting trees to required length; for dewatering; for installing the pipelines; for excavating (except rock excavation), laying, setting, and jointing all pipes and fittings; for furnishing and placing all bedding, haunching and initial backfill; for backfilling; for furnishing and placing all gravel required in areas of gravel shoulder; for compaction; for replacement of aggregate base and subbase material; for thrust blocks; for restraining joints; for furnishing and placing all temporary and/or permanent sheeting and bracing; for all labor, tools and construction equipment; for all connections to the existing water mains unless otherwise paid for; for cleaning and flushing including temporary flushing connections; for chlorination, temporary taps and fittings required for testing; and for all other work and expenses incidental thereto.
  - 2. Only ninety (90%) of the price per lineal foot of pipe shall be paid for upon its installation, the balance shall be withheld until such time as the pipe has been successfully tested and chlorinated and ready to be incorporated into the existing system. The above percentages are prior to the specified retainage to be withheld.
- C. All temporary items and labor necessary to properly protect work, test and chlorinate mains shall be covered under this item.
- D. Existing water main to be replaced in same trench shall be disposed of by the contractor, work to be covered under this unit price per linear foot.

Items No. 3 - Furnish and Install Ductile Iron Fittings

- A. Method of Measurement: Ductile iron fittings measured for payment shall be the actual number of compact ductile iron fittings installed complete in place.
- B. Basis of Payment: Ductile iron fittings shall be paid for at the unit price per pound stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials,

labor, equipment and tools; for installing, setting, and joining;' and for all other work and expenses incidental thereto. Mechanical joint restraints and thrust blocks shall not be included in the fitting weight for payment.

Items No. 4 - Furnish and Install Gate Valves

- A. Method of Measurement: Gate valves measured for payment shall be the actual number of valves and valve boxes installed complete in place.
- B. Basis of Payment: Gate valves shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools; for installing, setting, and jointing; for restraining joints; for testing all valves and valve boxes; and for all other work and expenses incidental thereto.

Items No. 5 - Furnish and Install Hydrant Assemblies

- A. Method of Measurement: Hydrants measured for payment shall be the actual number installed complete in place.
- B. Basis of Payment: Hydrant assemblies shall be paid for at the unit price each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools; for installing, setting and jointing; for excavation (except rock excavation); for all thrust blocks; restraining joints; for the hydrant, valve anchoring tee; 6-inch gate valve, and for all other work and expenses incidental thereto. 6-inch pipe necessary to connect the hydrant to the anchoring tee will be paid for under the appropriate pipe item.

Items No. 6 - Furnish and Install Water Services - Corporation Stops, Curb Stops and Box, Copper Service Pipe

- A. Method of Measurement:
  - 1. Corporation stops and taps measured for payment shall be the actual number furnished and installed for service connections.
  - 2. Curb stops measured for payment shall be the actual number installed.
  - 3. Copper service pipe measured for payment shall be the actual length in feet as measured along the center line of the pipe as laid.
- B. Basis of Payment:
  - 1. Corporation stops and taps shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for all fittings, labor, equipment, and tools necessary for the installation of the corporation stops; tapping the main; and for all work and expenses incidental thereto.
  - 2. Curb stops and boxes shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for all fittings, labor, equipment, tools and other materials required for the installation of the curb stop and box; for connection of the homeowner's existing service pipe to the curb stop; for trench dewatering; for excavating and backfilling; for replacing or rebuilding shrubs, fences, lawns, trees, and other materials except other such items specifically included in the Bid Schedule; and for all other work and expenses incidental thereto.
  - 3. Service pipe shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all service pipe, labor, equipment, tools, and other materials required for the installation of service pipes; for trench dewatering; for excavating, laying, setting, and jointing all pipes and fittings; for cleaning, testing, and disinfecting; for backfilling; for replacing or rebuilding shrubs, fences, lawns, trees,

or other materials, except other such items specifically included in the Bid Schedule; and for all other work and expenses incidental thereto.

Items No. 7 - Sewer Service Connections

- A. Method of Measurement: Sewer service connections measured for payment shall be linear feet measured from the top of the tee or wye to the edge of right-of-way measured along the centerline of the pipe.
- B. Basis of Payment:
1. Payment for furnishing and installing service connection lines will be made for the unit bid price in the Bid Schedule. The unit price shall include, but not be limited to, furnishing, installing, providing tees or wyes, excavating (except rock excavation), backfilling, compaction, replacement of aggregate base and subbase material, adequately capping service connection and marking location as specified and shown on the Drawings.

Items No. 8 - Removing and Relaying Existing Utilities

- A. Method of Measurement: The quantity to be paid shall be based on the length in feet of the utility to be replaced.
- B. Basis of Payment:
1. Payment for removing and relaying drains, sewer, water mains, gas mains, electrical and communication ducts and other utilities shall be made at the unit price bid per linear foot as stated in the Bid Schedule. Only such utilities which directly conflict with the new water main or sewer or utilities removed as deemed necessary by the Owner shall be measured and paid for under this item. Utilities shall only be removed and relayed and paid for when such lines cross the proposed utilities main at an elevation that conflicts with the grade of the proposed work; when a long angle crossing exists which may hinder the work and result in damage to the utilities and structures; where shown on the drawings; or when requested by the Owner. Utilities running parallel to the proposed pipeline shall be properly braced or otherwise protected to prevent displacement.
  2. Payment for removing and relaying existing utilities shall be made at the unit price bid per linear foot as stated in the Bid Schedule. Said unit price shall be full compensation for coordination with the affected utility; for furnishing labor, tools, and equipment; for disposal of existing pipe; for furnishing and placing replacement borrow material; for repairing all pavement damage outside the payment widths for paving; and for all other work and expenses incidental thereto.

Items No. 9 - Ledge Excavation, Disposal and Replacement Backfill

- A. Method of Measurement: The quantity of ledge excavation to be paid for shall be the actual number of cubic yards of ledge removed within the limits of normal excavation. For pipelines, the limits are defined by the vertical planes at a distance three feet apart and to a depth of six inches below the bottom of the pipe. For structures, the limits are defined as 2 feet beyond (horiz) the finished structure footing and 1 foot below the bottom of the footing or floor. Field measurements for computing ledge volumes shall be determined by one of the following methods as selected by the Engineer.
1. From ledge profile of exposed surface.

2. By field measurements of the length of the trench ledge excavated and the average depth of ledge excavation as determined by the field representative.
  3. The volume of rocks shall be determined from their average length, width, and depth as measured by the field representative. Boulders more than 2 cubic yards in volume shall be paid for as ledge.
- B. Basis of Payment: Ledge excavation and disposal shall be paid for at the unit price per cubic yard as stated in the Bid Schedule (Min. \$50.00 C.Y. - Max. \$120.00 C.Y.). Said unit price shall be full compensation for furnishing all materials, labor, tools, and equipment; for disposal of ledge; for furnishing and placing replacement granular borrow material; for conducting all preblast surveys and investigations; for repairing all overblast; for repairing all pavement damage outside the payment widths for paving; and for all other work and expenses incidental thereto.

Items No. 10 - Earth Excavation below Grade and Replacement Backfill

- A. Method of Measurement: Earth excavation below grade (below the bottom of the bedding layer by order of the Engineer) and replacement backfill below grade accepted for payment shall be the actual number of cubic yards installed and accepted complete in place.
- B. Basis of Payment: The Contract unit price per cubic yard for earth below grade and replacement backfill below grade furnished and installed shall be full compensation for labor, materials, tools and equipment necessary to complete this work including; excavation and disposal of unsuitable materials including muck, crib work, trees, stumps and all other buried refuse; replacement suitable fill, compaction, dewatering and all else incidental thereto for which payment is not provided under other items.

Item No. 11 - Furnishing and Placing of Suitable Material Above Trench Grade to Replace Unsuitable Material

- A. Method of Measurement: The quantity of suitable material placed above trench grade to be paid for shall be the actual number of cubic yards of material placed as required by and/or authorized by the Engineer as measured following excavation.
- B. Basis of Payment: Placement of Suitable Material shall be paid for at the unit price per cubic yard stated in the Bid Schedule. Said unit price shall be measured from a point fifteen inches below the road surface to twelve inches above the top of the pipe and to a width of two feet plus the inside pipe diameter.
- C. Bedding material placed from a point six inches below the bottom of the pipe to a point of one foot above the top of the pipe shall be covered under the respective Bid Item for installing water main.

Items No. 12 - Bituminous Concrete Pavement

- A. Method of Measurement - Bituminous concrete pavement accepted for payment shall be the number of tons of pavement placed at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
1. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the Drawings.



2. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch of thickness.
- B. Basis of Payment: Pavement shall be paid for at the Contract unit price per ton stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for the placement and removal of pavement. No additional payment will be made to the contractor for repair work done by him in maintaining bituminous concrete pavement.

Items No. 13 - Remove and Reset Curb

- A. Method of Measurement: Curb measured for payment shall be the actual linear footage of curb installed and accepted complete and in place.
- B. Basis of Payment: The Contract unit price per linear foot for removing and resetting curb shall constitute full compensation for all labor, equipment and materials necessary to complete this work including carefully labeling removing curb, safely storing curb for reuse, re-installing curb, subgrade preparation, placement of concrete fill, backfill, compaction, and all labor and appurtenances incidental thereto for which payment is not provided under other items.

Items No. 14 - Repair of Sidewalks

- A. Method of Measurement:
1. Bituminous concrete sidewalks and curbs measured for payment shall be the number of tons of pavement installed and accepted in place.
    - a. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the Drawings.
    - b. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch of thickness.
- B. Basis of Payment:
1. Pavement shall be paid for at the contract unit price per ton for bituminous concrete sidewalks and curbs stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, materials, equipment and tools necessary for the placement and removal of bituminous sidewalks and curbs. No additional payment will be made to the contractor for repair work done by him in maintaining bituminous concrete pavement.

Items No. 15 - Erosion Control

- A. Method of Measurement: Payment for erosion control shall be on a lump sum basis.
- B. Basis of Payment: Payment of the lump sum amount for erosion control shall be full compensation for installation, maintenance and removal of the type and quantity of erosion control devices as required and shown on the drawings.

Items No. 16 - Temporary Water Mains

- A. Method of Measurement: Temporary water mains measured for payment shall be on a Lump Sum basis following installation and successful testing.
- B. Basis of Payment: Temporary water lines, hydrant assemblies, saddles, taps, corporation stops and appurtenances shall be paid for at the lump sum price in the Bid Schedule. the lump sum price shall be full compensation for furnishing all labor, materials, and equipment required to provide a fully operational temporary water system including mainlines and services as

specified; for removing all temporary lines at the resumption of water service; for placing and maintaining fill over temporary mains at drives, walks, etc.; for making connections to buildings; for excavation and connection to existing mains and services; for cleaning, pressure testing, and disinfecting temporary lines; for coordinating connections and shut-offs with the Owner; and for all other work and expenses incidental thereto.

Item No. 17 - Test Pit Excavation, Backfill and Restoration

- A. Method of Measurement - Test pit excavation measured for payment shall be per each unit completed as ordered by the Engineer and as indicated on the Drawings.
- B. Basis of Payment - The contract unit price for each test pit excavation shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including cutting existing pavement, hand and machine excavation, repairing damage to pipes, utilities, structures and property backfilling, compaction, maintenance and all else incidental thereto for which payment is not provided under other items.

Item No. 18 - Utility Coordination

- A. Method of Measurement – Utility coordination measured for payment shall be on a Lump Sum basis.
- B. Basis of Payment: Coordination with Utilities costs are those costs of working with utilities (gas, power, sewer, water, etc.), including but limited to timely communication and consultation with companies, public entities, and agencies; utility services (utility pole holding, utility pole relocation, gas line relocation, contacting Dig-Safe etc.); including working around utility poles prior to relocation. The contract lump sum price shall be full compensation for all labor, materials and equipment necessary to complete this work. The contract lump sum price shall be paid in a series of equal partial payments made to cover all Coordination with Utilities costs throughout the entire contract.

Items No. 19 - Uniformed Police Traffic Control

- A. Method of Measurement – Uniformed police details will be paid based on actual invoices submitted by the Contractor and will be paid from the Bid Item allocation.
- B. Basis of Payment: Cash allowance as compensation for fees associated with providing uniformed police officer in accordance with the requirements of the City of Waltham Police Department. The cost associated, MUTCD signage, and other traffic control requirements shall be considered incidental to the work. Adjustment to the final cost for this item will be made as follows. Prior to final payment, Contractor shall present all receipts for this work (if not previously presented to the Engineer), and the amount due will be deducted from the allowance.

Item No. 20– Price Adjustment Allowance

- A. Method of Measurement - An allowance is included in the bid schedule for price adjustments for fuel (diesel and gasoline), Liquid Asphalt and Portland Cement contained in cast-in-place concrete, as defined in Section 01151.
- B. Basis of Payment: Payment shall be paid based on receipts provided by the Contractor and shall be deducted from the allowance stated in the Bid Schedule.

Item No. 21 – Utility Repair Allowance

- A. Method of Measurement – Payment for utility repairs as directed by City shall be based on time and materials and actual invoices submitted.
- B. Basis of Payment: The contract allowance for utility repairs to existing sewer and drainage piping and structures shall be full compensation for labor, materials, tools and equipment necessary to complete the work including: gravity sewer pipe replacement/repair, sewer manhole replacement/repair, drainage pipe replacement/repair, drainage manhole replacement/repair, and catchbasin replacement/repair. It is the intent of the work to repair and/or replace any existing sewer or drainage utility as required based on field observations of the existing condition of utilities during construction. At the time of bidding it is unknown how many existing structures or piping will need to be replaced/repared. Work for this item will be identified in the field during construction and as directed by the City. A time extension to the contract will be incorporated equal to the amount of time spent performing the work under this item only. All work for this item shall be paid based on time and materials and actual invoices submitted. The amounts submitted will be paid from the allocation.

END OF SECTION

SECTION 01151SPECIAL PROVISIONS – PRICE ADJUSTMENTSPART 1 - GENERAL1.1 DESCRIPTION

- A. In accordance with Massachusetts General Law (MGL) Chapter 30, Section 38A, contracts for water and sewer projects awarded under MGL Chapter 30 Section 39M shall include price adjustment clauses for fuel (both diesel and gasoline), liquid asphalt and Portland cement contained in cast-in-place concrete.
- B. The work under this Contract includes price adjustments for hot mix asphalt, Portland cement, diesel fuel, and gasoline. Base Prices for hot mix asphalt, Portland cement, diesel fuel, and gasoline under this Project are defined as the Price presented on the Massachusetts Department of Transportation (MassDOT) website. MassDOT posts Price Adjustments on their Highway Division's website at <http://www.massdot.state.ma.us/Highway/> under the following link sequences:

Website: massdot.state.ma.us  
 Tab1: Highway  
 Link1: Doing Business With Us  
 Link2: Construction  
 Link3: Price Adjustments

Prices may not be available for the month in which the project is Bid at the time the project is advertised for Bid. The Base Price will be established at Contract Award. For this project, the recent Base Price History for the specified items is presented within Table 1.

<b>Table 1 –Base Price History</b>				
Description	Unit	January 2014	February 2014	March 2014
Diesel Fuel	per gallon	\$3.604	\$3.766	N/A
Gasoline	per gallon	\$3.055	\$3.155	N/A
Hot Mix Asphalt	per ton	\$640.00	\$640.00	\$640.00
Portland Cement	per ton	\$110.00	\$110.00	\$112.15

N/A = Not Available

1.2 MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE

- A. Method of Measurement: Price adjustments for fuel consumption will be paid for out of the Price Adjustment Allowance Item on the Bid Form. In order to comply with the MGL, compensation for fluctuations in fuel prices will be made based on monthly quantities of the designated work items completed during the payment period and the Fuel Use Factors presented in Table 5.

- B. Basis of Payment: The Contractor shall include a separate line item in the Payment Application for Price Adjustments for Diesel Fuel and Gasoline; which will be subtracted from the Price Adjustment Bid Allowance (Item 20). The Price Adjustment will be based on the variance in price for diesel fuel and gasoline from the Base Price to the Period Price only. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following month's Payment Application once pricing information for the period is available.
1. Base Price: The Base Price of Diesel Fuel and Gasoline will be the price as indicated on the MassDOT website ([www.massdot.state.ma.us](http://www.massdot.state.ma.us)) for the month in which the contract was bid, which includes State Tax.
  2. Period Price: The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month as posted on the MassDOT website.
  3. The adjustment will be based on fuel usage factors for various items of work developed in the National Cooperative Highway Research Program Report 744 (Transportation Research Board, 2013). These factors will be multiplied by the quantities of work completed under the designated Work Item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.
  4. The fuel Price Adjustment will apply only to the items of work listed in Table 5 at the fuel factors shown and for the quantities of those work items during that month.
  5. The Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
  6. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

### 1.3 MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT MIXTURES

- A. Method of Measurement: The quantity of the hot mix asphalt (HMA) mixtures will be measured under the respective Bid Item(s) in the Contract. The Price Adjustment will be made based on the quantity installed during the monthly payment period.
- B. Basis of Payment: The Contract Price of the hot mix asphalt (HMA) mixtures will be paid under the respective Bid Item(s) in the Contract. The Contractor shall include a separate line item in the Payment Application for Price Adjustments for Hot Mix Asphalt Mixtures; which will be subtracted from the Price Adjustment Bid Allowance (Item 20). The Price Adjustment will be based on the variance in price for the liquid asphalt component only from the Base Price to the Period Price only. The adjustment shall not include transportation or other charges. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following month's Payment Application once pricing information for the period is available.

1. Base Price: The Base Price of Hot Mix Asphalt Mixtures will be the price as indicated on the MassDOT website (www.massdot.state.ma.us) for the month in which the contract was bid.
2. Period Price: The MassDOT website lists two sets of period prices. The “New Asphalt Period Price Method” applies to this Contract.
3. The “New Asphalt Period Price Method” presents the Period Price of liquid asphalt for each monthly period as determined by MassHighway using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. MassHighway will post this Period Price on their website within two business days following their receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted MassHighway the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.
4. The Contract Price of the hot mix asphalt mixture will be paid under the respective item in the Contract. The Price Adjustment, as herein provided, upwards or downwards, will be made after the work has been completed and accepted, using the monthly period price for the month during which the work was performed and will be paid under the designated Price Adjustment line item in the Payment Application.
5. The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Contract Documents.
6. The Price Adjustment will be determined using the following formula; the quantity of tons of hot mix asphalt mixture placed during each monthly period multiplied by the liquid asphalt content percentage multiplied by the variance in price between Base Price and Period Price of liquid asphalt. The liquid asphalt content, for the purpose of this adjustment, will be 5.5% (0.055) for each ton of bituminous concrete mixture regardless of percentages established in the Massachusetts Job Mix Formula (M3.11.03) of the Standards.
7. The Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
8. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

1.4 MONTHLY PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

- A. Method of Measurement: The quantity of the Portland Cement Concrete Mixes will be measured under the respective items in the Contract. The Price Adjustment will be made based on the quantity installed during the monthly payment period.
- B. Basis of Payment: The Contract Price of the Portland Cement Concrete Mixes will be paid under the respective item(s) in the Contract. The Contractor shall include a separate line item in the Payment Application for Price Adjustments for Portland

Cement Concrete Mixes; which will be subtracted from the Price Adjustment Bid Allowance (Item 20). The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price only. It shall not include transportation or other charges. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following month's Payment Application once pricing information for the period is available.

1. The Base Price of Portland cement will be the price as indicated on the MassDOT website ([www.massdot.state.ma.us](http://www.massdot.state.ma.us)) for the month in which the contract was bid, which includes State taxes.
2. The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the Construction Economics section of ENR Engineering News-Record magazine or at the ENR website <http://www.enr.com> under Construction Economics. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.
3. The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been completed and accepted, using the monthly period price for the month during which the work was performed and will be paid under the designated Price Adjustment line item in the Payment Application.
4. The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.
5. The Price Adjustment will be determined using the following formula; the quantity of cubic yards of Portland cement concrete placed during each monthly period multiplied by the Portland cement content percentage multiplied by the variance in price between the Base Price and Period Price of Portland cement.
6. This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
7. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

## PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION3.1 PREPARATION OF MONTHLY PAYMENT APPLICATION

- A. Payment Applications shall be submitted monthly. Table 2 presents an example calculation for determining Price Adjustments for the specified items.

Note: The Payment Application for June will be submitted at the end of June or early in July and shall include all of the work performed during the month of June and Price Adjustments for the work performed in May.

For this example, 1,000 linear feet of 12-inch diameter water main was installed and 400 tons of full-width final bituminous pavement over 1,000 feet of roadway were completed in May. No concrete was installed during the Month of May.

Description	Unit	Base Price	May 2013	June 2013
Diesel Fuel	per gallon	\$3.25	\$3.50	N/A
Gasoline	per gallon	\$3.00	\$3.20	N/A
Hot Mix Asphalt	per ton	\$600.00	\$625.00	N/A
Portland Cement	per ton	\$100.00	\$90.00	N/A

Based on the example Prices presented in Table 2, an assessment of whether or not Price Adjustments are required for this example will be performed as presented in Table 3.

Item	Base Price	Period Price	Price Difference	% Change	Price Adjustment Required
Diesel Fuel	\$3.25	\$3.50	\$0.25	7.7%	Yes, >5%
Gasoline	\$3.00	\$3.20	\$0.20	6.7%	Yes, >5%
Hot Mix Asphalt	\$600.00	\$625.00	\$25.00	4.2%	No, <5%
Portland Cement	\$100.00	\$90.00	-\$10.00	-10%	Yes, >5%

As indicated in Table 3, Price Adjustments for this example are required for Diesel Fuel, Gasoline and Portland cement if work items were performed during the Month of May.

Table 4 presents the Price Adjustment calculations for this example.



Work Item	Quantity	Unit	FUF <sup>1</sup>	Price Difference	Price Adjustment
12-inch Water Main					
Diesel Fuel	1,000	L.F	0.610	\$0.25	\$152.50
Gasoline	1,000	L.F	0.261	\$0.20	\$52.20
Asphalt Hauling/Placement					
Diesel Fuel	400	Ton	1.104	\$0.25	\$210.40
Gasoline	400	Ton	0.502	\$0.20	\$40.16
<b>TOTAL PRICE ADJUSTMENT</b>					<b>\$455.26</b>

1. FUF = Fuel Use Factor

Note: The example indicates that a Price Adjustment will be applied for the payment period for fuel associated with asphalt hauling and placement, but no Price Adjustment would be applied for Hot Mix Asphalt Mixtures as the Price difference for the material was less than 5%. Also, no Price Adjustment is included for Portland cement as no quantity of concrete was completed during the pay period. If concrete had been installed, it would have resulted in a negative Price Adjustment or deduction.

B. Table 5 presents the Fuel Use Factors to be used for this project.

Work Items	Diesel Use Factor	Gasoline Use Factor
Pipe Installation – including excavation, backfill, pipe installation, fittings, valves, insulation, and incidentals	0.610 gallons per Linear Foot	0.261 gallons per Linear Foot
Water Service – including excavation, backfill, pipe installation, valves, insulation, and incidentals	0.610 gallons per Linear Foot	0.261 gallons per Linear Foot
Temporary Asphalt Pavement – including haul, placement and compaction, etc.	2.104 gallons per Ton <sup>1</sup>	0.502 gallons per Ton <sup>1</sup>
Permanent Asphalt Pavement – including haul, placement and compaction for trench and sidewalk, and incidentals	2.104 gallons per Ton <sup>1</sup>	0.502 gallons per Ton <sup>1</sup>
Curbing – including removal, replacement or reinstallation of either asphalt or granite, and incidentals	0.106 gallons per Linear Foot	0.046 gallons per Linear Foot
Rock Excavation – including ledge and boulder removal and disposal, and material replacement, and incidentals	0.326 gallons per Cubic Yard	0.140 gallons per Cubic Yard
Unsuitable Material Excavation – including excavation and disposal, and material replacement, and incidentals	0.207 gallons per Cubic Yard	0.112 gallons per Cubic Yard

END OF SECTION

SECTION 01200PROJECT MEETINGSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: To enable orderly review during progress of the work, and to provide for systematic discussion of problems, the Engineer will conduct project meetings throughout the construction period.
- B. The Contractor's relations with his subcontractors and materials suppliers and discussions relative thereto, are the Contractor's responsibility and are not part of project meetings content.

1.2 QUALITY ASSURANCE

- A. Persons designated by the Contractor to attend and participate in the project meetings shall have all required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

- A. Agenda items: To the maximum extent practicable, advise the Engineer at least 24 hours in advance of project meetings regarding all items to be added to the agenda.
- B. Minutes: The Engineer will compile minutes of each project meeting and will furnish a copy to the Contractor.

PART 2 - PRODUCTS

(No products are required in this Section.)

PART 3 - EXECUTION3.1 MEETING SCHEDULE

- A. Except as noted below for Preconstruction Meeting, project meetings will be held monthly. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

- A. Meetings will be held at a mutually agreeable location.

3.3 PRECONSTRUCTION MEETING

- A. Preconstruction meeting will be scheduled within twenty days after the Effective Date of the Agreement, but before the Contractor starts work at the site. Provide attendance by authorized representatives of the Contractor and all major subcontractors. The Engineer will advise other interested parties and request their attendance.
- B. Minimum agenda: Distribute data on, and discuss:

1. Identification of key project personnel for Owner, Engineer, Contractor, funding/regulatory Agencies.
2. Responsibilities of Owner, Engineer, Resident Project Representative, Contractor.
3. Channels and procedures for communications.
4. Construction schedule, including sequence of critical work.
5. Easements, permits.
6. Contract Documents, including distribution of required copies of original documents and revisions.
7. Processing of Shop Drawings and other data submitted to the Engineer for review.
8. Processing of field decisions and Change Orders.
9. Rules and regulations governing performance of the Work, including funding/regulatory Agency requirements.
10. Procedures for safety and first aid, security, quality control, housekeeping, and other related matters.

#### 3.4 PROJECT MEETINGS

- A. Attendance: To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work. The Superintendent shall attend. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspects of the Work are involved.
- B. Minimum agenda:
  1. Review, revise as necessary, and approved minutes of previous meeting.
  2. Review progress of the Work since last meeting, including status of submittals for approval.
  3. Review schedule of work to be accomplished prior to next meeting.
  4. Discuss monthly partial payment request.
  5. Review status of change order requests and Work Directive Changes.
  6. Identify problems which impede planned progress.
  7. Develop corrective measures and procedures to regain planned schedule.
  8. Complete other current business.

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Within ten (10) days after the effective date of the Agreement between Owner and Contractor submit to the Engineer an estimated progress schedule as specified herein.
- B. Form of Schedules:
  - 1. Narrative: Completely describe the construction methods to be employed.
  - 2. Network Analysis System (Gantt Chart):
    - a. Provide a separate horizontal schedule line for each trade or operation and show concurrent and preceding activities.
    - b. Present in chronological order the beginning of each trade or operation showing duration and float time.
    - c. Scale: Identify key dates and allow space for updating and revision.
  - 3. Mathematical Analysis:
    - a. A mathematical analysis shall accompany the network diagram. A computer printout will be acceptable.
    - b. Information shall be included on activity numbers, duration, early start, late start, etc. and float times.
  - 4. The schedule shall be developed using Microsoft Project or other scheduling software approved by the ENGINEER and OWNER.
- C. Content of Schedules:
  - 1. Provide complete sequence of construction by activity:
    - a. Shop Drawings, Project Data and Samples:
      - 1) Submittal dates.
      - 2) Dates reviewed copies will be required.
    - b. Decision dates for:
      - 1) Products specified by allowances.
      - 2) Selection of finishes.
    - c. Estimated product procurement and delivery dates.
    - d. Dates for beginning and completion of each element of construction.
  - 2. Identify work of separate phases and logically grouped activities.
  - 3. Show the projected percentage of completion for each item of work as of the first day of each month.
  - 4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.
- D. Updating:
  - 1. Show all changes occurring since previous submission.
  - 2. Indicate progress of each activity, show completion dates.
  - 3. Include:
    - a. Major changes in scope.
    - b. Activities modified since previous updating.

- c. Revised projections due to changes.
- d. Other identifiable changes.
- 4. Provide narrative report, including:
  - a. Discussion of problem areas, including current and anticipated delay factors.
  - b. Corrective action taken, or proposed.
  - c. Description of revisions that may affect schedules.

1.2 SUBMITTALS

- A. Submit schedules in electronic format and hard copy as follows:
  - 1. Prior to start of work
  - 2. Bi-weekly
  - 3. When there are changes in the schedule
  - 4. With each progress payment request
- B. Submit 4 copies of initial and updated schedules to the Engineer.

END OF SECTION

SECTION 01320

SAFETY AND HEALTH PLAN

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work, as outlined herein and in the General and Special Conditions of the Contract Documents. Within (10) days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer a Safety and Health Plan as specified herein.
2. Contractor shall comply with all applicable Laws and Regulations related to the safety of persons or property, or for the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
3. Contractor shall designate a qualified and experienced safety representative (OSHA defined "Competent Person") at the site whose duties and responsibilities shall be the prevention of accidents and maintaining and supervising of safety precautions and programs, including a "Job Hazards Analysis".
4. The Contractor shall be solely responsible to provide all labor, equipment, and utilities sufficient to ensure no construction noise, particulates, or odors, are allowed to accumulate to levels which adversely affect health or work in, or near the construction area.

B. Content of Safety and Health Plan:

1. Prepare complete safety and health plan in accordance with the requirements of CFR Title 29 Part 1926 - Safety and Health Regulations for Construction.
  - a. Provide documentation that Contractor's hazardous communication program is up to date.
  - b. Provide documentation that Contractor's safety training is up to date.
  - c. Prepare a project specific Safety and Health Plan addressing construction safety issues, including but not limited to excavations, fall protection and egress, excavation adjacent to existing utilities, traffic and pedestrian safety, materials handling, and other potential safety issues.
2. Safety provisions for confined space entry shall follow General Industry Standard CFR Title 29 Part 1910.146 and will be incorporated into the Safety and Health Plan.
  - a. The Contractor shall be responsible for all aspects of construction site safety including development of appropriate confined space entry procedures. The plan shall include, but not necessarily be limited to, the following:
    - Definitions
    - Confined Space Evaluations

- Equipment Selection
  - Confined Space Entry Training Documentation
  - Permit Required Confined Space Entry Requirements
  - Testing (Monitoring) and Ventilation
  - Confined Space Entry Permit Form
  - Rescue and Emergency Procedures
  - Emergency Contact Information
- b. The Contractor shall inform the Owner and Engineer's representative whenever work will be performed in a confined space and the permit space program that the Contractor will follow.
  - c. The Contractor shall inform the Owner and Engineer's representative of any hazards confronted or created during entry operations, either through a briefing or during the entry operation.
  - d. The Contractor will coordinate entry operations with the Owner when both Owner personnel and Contractor personnel will be working in or near permit spaces.
  - e. The Owner, Engineer, their representatives, independent testing laboratories and government agencies, when inspecting the site, shall be supplied by the Contractor proper safety equipment when entry into a confined space is required.
- C. Updating:
- 1. Contractor shall be responsible for updating the Safety and Health Plan as appropriate throughout the course of the construction period.

## 1.2 SUBMITTALS

- A. **Contractor shall be responsible for all aspects of construction site safety.** Provide 3 copies of the Contractor's site specific Safety and Health Plan to the Engineer. The Safety and Health Plan is provided for information only to inform the Owner, Engineer (and Resident Project Representative) of the project specific safety program requirements. The Contractor will overview the plan with the Owner (and staff), Engineer (and Resident Project Representative) at the beginning of the project, and subsequently when the safety plan is updated.
- B. Provide updated Safety and Health Plans as necessary during the course of the project.
- C. Contractor's most current Safety and Health Plan shall be available at the construction site throughout the construction project.

## 1.3 ON-SITE COORDINATION MEETINGS

- A. Contractor shall review key aspects of Safety and Health Plan at the Pre-Construction Meeting, and subsequent on-site safety informational meeting.
- B. Contractor shall report to Engineer and Owner at each progress meeting concerning compliance with the Safety and Health Plan for the most recent construction period and new considerations and requirements for the upcoming period.

END OF SECTION

SECTION 01340SUBMITTALSPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Submit to the Engineer, Shop Drawings, Manufacturers' Certificates, Project Data, and Samples required by the Specification Sections.

1.2 SHOP DRAWINGS

- A. Shop Drawings are required for each and every element of the work. Each shop drawing shall be assigned a sequential number for purposes of easy identification, and shall retain its assigned number, with appropriate subscript, on required resubmissions.
- B. Shop Drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills of material, manufacturers data, spare parts lists, and other data prepared by the Contractor, his subcontractors, suppliers, or manufacturers which illustrate the manufacturer, fabrication, construction, and installation of the work, or a portion thereof.
- C. The Contractor shall submit to the Engineer a minimum of 6 copies of Shop Drawings and approved data and 1 electronic copy. The Engineer will retain 3 copies (for Owner's, Engineer's and Field Representative's files) and return 3 copies to the Contractor for distribution to subcontractors, suppliers and manufacturers. If the Contractor requires more than 3 then the number of copies submitted shall be adjusted accordingly. All shop drawing comments will be summarized on the Submittal Review Form.
- D. The Contractor shall provide a copy of the completed Submittal Certification Form (copy provided for Contractor's use at the end of this Specification Section) which shall be attached to every copy of each shop drawing. Shop Drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the work.
- E. Shop Drawings shall be submitted as a complete package by specification section, unless otherwise reviewed and approved by the Engineer. It is the intent that all information, materials and samples associated with each specification section be included as a single submittal for the Engineer's review. Any deviation from this requirement, such as submitting miscellaneous metals grouped by structure, shall be requested in writing with an anticipated shop drawing breakdown/schedule prior to any associated submittal.
- F. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.
- G. No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as



hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

- H. Until the necessary review has been made, the Contractor shall not proceed with any portion of the work (such as the construction of foundations), the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which review is required.
- I. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. Shop drawings shall be of standardized sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard sizes shall be: (a) 24 inches by 36 inches; (b) 11 inches by 17 inches, and (c) 11 inches by 8-1/2 inches. Provision shall be made in preparing the shop drawings to provide a binding margin on the left hand side of the sheet. Shop drawings submitted other than as specified herein may be returned for resubmittal without being reviewed.
- J. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer.
- K. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal. Shop Drawings that contain significant deviations that are not brought to the attention of the Engineer may be subject to rejection.
- L. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.
- M. A maximum of two submissions of each Shop Drawing will be reviewed, checked, and commented upon without charge to the Contractor. Any additional submissions which are ordered by the Engineer to fulfill the stipulations of the Drawings and Specifications, and which are required by virtue of the Contractor's neglect or failure to comply with the requirements of the Drawings and Specifications, or to make those modifications and/or corrections ordered by the Engineer in the review of the first two submissions of each Shop Drawing, will be reviewed and checked as deemed necessary by the Engineer, and the cost of such review and checking, as determined by the Owner, and based upon Engineer's documentation of time and rates established for additional services in the Owner-Engineer Agreement for this Project, may be deducted from the Contractor to make all modifications and/or corrections as may be required by the Engineer in an accurate, complete, and timely fashion. Resubmittals for the sole purpose of providing written responses to review

comments will not be considered a resubmittal counting towards the two submission limit.

### 1.3 SAMPLES

- A. The Contractor shall submit samples when requested by the Engineer to establish conformance with the specifications, and as necessary to define color selections available.

### 1.4 MANUFACTURER'S CERTIFICATES

- A. Prior to accepting the installation, the Contractor shall submit manufacturer's certificates for each item specified.
- B. Such manufacturer's certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction. All costs for meeting this requirement shall be included in the Contractor's bid price.

### 1.5 SUBMISSION REQUIREMENTS

- A. Accompany submittals with transmittal letter, containing:
  - 1. Sequential Transmittal Number
  - 2. Date.
  - 3. Project title and number.
  - 4. Contractor's name and address.
  - 5. The sequential shop drawing number (called the Engineer's Shop Drawing number) of each shop drawing, project data and sample submitted.
    - i. Engineer's shop drawing number shall start at 001 for the first shop drawing in the first transmittal and continue sequentially until the last shop drawing is submitted.
    - ii. Resubmissions shall be denoted with a letter following the number. For example the first resubmission of Shop Drawing 001 shall be numbered 001A, a second resubmission of shop 001 shall be numbered 001B, and that sequence shall continue for any subsequent resubmissions.
  - 6. The Contractor's Shop Drawing number (if a different numbering system to the Engineer's number is used by the Contractor).
  - 7. Notification of deviations from Contract Documents.
  - 8. Other pertinent data.
- B. A completed Submittal Certification Form shall be attached to each copy of each shop drawing and must include:
  - 1. Identification of deviations from Contract Documents.
  - 2. Contractor's stamp, initialed or signed, certifying review of the submittal, verification of field measurements and compliance with Contract Documents.
  - 3. Where specified or when requested by the Engineer, manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements.
  - 4. Where specified, manufacturer's guarantee.

C. Requirements for Electronic Submittals:

1. Each individual shop drawing shall be contained in one PDF.
2. The first page of the PDF shall be the Submittal Certification Form, which clearly identifies the submittal, specification section and shop drawing number. File names shall also identify the submittal contained in the PDF. Example file name: 02444-(Shop Drawing No.).pdf
3. The electronic copy in PDF form shall be **exactly** as submitted in the hard copy. Electronic copies in PDF form shall be submitted on a CD or DVD and shall accompany the hard copies.
4. PDF versions of 24x36 drawings shall be converted to 24 x 36 PDFs so as not to lose the clarity of the original drawing.
5. Electronic submittals that are not submitted in accordance with the requirements stated above will not be reviewed by the Engineer.

1.7 RESUBMISSION REQUIREMENTS

- A. Revise initial drawings as required and resubmit as specified for initial submittal.
- B. Indicate on drawings any changes which have been made other than those required by Engineer. All renumbering of shop drawings, relabeling of individual pieces or assemblies or relocating of pieces or assemblies to other Drawings within the submittal shall be clearly brought to the attention of the Engineer.

1.8 ENGINEER'S REVIEW

- A. The review of shop and working drawings hereunder will be general only, and nothing contained in this specification shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.
- B. The Engineer's review comments will be summarized on a Submittal Review Form, which includes an action code. A description of each action code is provided below.
  1. **No Exceptions Taken (Status 0 on shop drawing log).** The shop drawing complies with the Contract Document requirements. No changes or further information are required. Where appropriate, the submittal review form will be used to alert the Contractor, Owner and Field personnel of remaining items within that specification section that still needs to be submitted.
  2. **Make Corrections Indicated (Status 1 on shop drawing log).** The shop drawing complies with the Contract Document requirements except for minor changes, as indicated. Resubmittal is not required unless it is specifically called for; however, Engineer requires that all comments will be addressed by the Contractor, unless otherwise notified in writing prior to execution of the relevant work.
  3. **Conditional to Remarks (Status 2 on shop drawing log).** The shop drawing potentially complies with the Contract Document requirements, contingent upon satisfactory resolution of review comments. Remarks will explicitly list what information needs to be resubmitted. Resubmittal from the Contractor

should include a cover letter or summary which indicates how each review comment has been addressed.

4. **Revise and Resubmit (Status 3 on shop drawing log).** The shop drawing does not comply with the Contract Document requirement as submitted, but may with changes indicated and/or submission of additional information. The entire package must be resubmitted with the necessary information and a cover letter which indicates how each review comment has been addressed and where to find the information in the resubmittal.
5. **Rejected (Status 4 on shop drawing log).** The shop drawing does not comply with the Contract Document requirements, for the reasons indicated in the remarks, and is unacceptable.
6. **In Review (Status 5 on shop drawing log).** The shop drawing is currently under review.
7. **For Information Only (Status 6 on shop drawing log).** The shop drawing review was informational only. No comments are provided.

SUBMITTAL CERTIFICATION FORM

PROJECT: \_\_\_\_\_ CONTRACTOR'S PROJ. NO: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_ ENGINEER'S PROJ. NO: \_\_\_\_\_

ENGINEER: \_\_\_\_\_

TRANSMITTAL NUMBER: \_\_\_\_\_ SHOP DRAWING NUMBER: \_\_\_\_\_

SPECIFICATION SECTION OR DRAWING NO: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

MANUFACTURER: \_\_\_\_\_

The above referenced submittal has been reviewed by the undersigned and I/we certify that the material and/or equipment meets or exceeds the project specification requirements with

NO DEVIATIONS  
or

A COMPLETE LIST OF DEVIATIONS AS FOLLOWS<sup>a</sup>:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_ By: \_\_\_\_\_

Contractor<sup>b</sup>

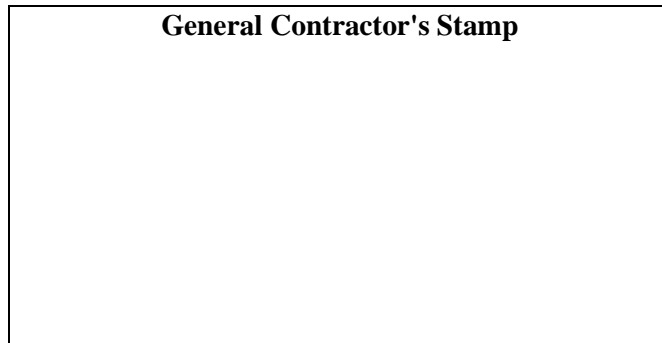
Manufacturer<sup>c</sup>

Date: \_\_\_\_\_ Date: \_\_\_\_\_

<sup>a</sup> Any deviations not brought to the attention of the Engineer for review and concurrence shall be the responsibility of the Contractor to correct, if so directed.

<sup>b</sup> Required on all submittals

<sup>c</sup> When required by specifications Page \_\_\_\_ of \_\_\_\_



SECTION 01370SCHEDULE OF VALUESPART 1 - GENERAL1.1 DESCRIPTION

- A. Extent of Work:
  - 1. Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.
- B. Related Work Specified Elsewhere:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections of these Specifications.
  - 2. Schedule of values is required under the General Conditions.
  - 3. Schedule of values is required to be compatible with applications for progress payment.

1.2 QUALITY ASSURANCE

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so required by the Engineer, provide copies of the subcontracts or other data acceptable to the Engineer substantiating the sums described.

1.3 SUBMITTALS

- A. Prior to first application for payment, submit a proposed schedule of values to the Engineer.
  - 1. Secure the Engineer's approval of the schedule of values prior to submitting first application for payment.

END OF SECTION

SECTION 01380CONSTRUCTION PHOTOGRAPHSPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Pre-Construction Record: Contractor shall utilize digital photographs and video to obtain a visual record of the project area; copies of same shall be given to the Engineer and Owner.
2. Notify Engineer at least three (3) working days prior to photographing or videoing the project area so Engineer may, at his option, observe.

1.2 QUALITY

- A. Pre-Construction Record: Quality shall be such that the condition of existing pavement, curbing, driveway entrances, sidewalks, etc. can be readily determined.

1.3 SUBMITTAL OF PRINTS

- A. Pre-Construction Record: Submit hard copy prints and electronic files on CD ROM, and video electronic files on DVD to the Engineer and Owner prior to any construction work.
- B. The quality of the photos and video are subject to approval by the Engineer prior to the start of construction work in the areas shown by the photos.

END OF SECTION

SECTION 01400QUALITY CONTROLPART 1 - GENERAL1.1 REQUIREMENTS INCLUDED

- A. General Quality Control.
- B. Workmanship.
- C. Manufacturer's Instructions.
- D. Manufacturer's Certificates.
- E. Manufacturer's Field Services.
- F. Testing Laboratory Services.

1.2 RELATED REQUIREMENTS

- A. Section 00700 - General Conditions: Inspection and testing required by governing authorities.
- B. Section 01340 - Submittals: Submittal of Manufacturer's Instructions.
- C. Section 02200 - Earthwork.
- D. Section 03300 – Cast-in-Place Concrete

1.3 QUALITY CONTROL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.4 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 MANUFACTURERS' INSTRUCTIONS

- A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.6 MANUFACTURERS' CERTIFICATES

- A. When required by individual Specifications Section, submit manufacturer's certificate that products meet or exceed specified requirements.

1.7 MANUFACTURERS' FIELD SERVICES

- A. When specified in respective Specification Sections, require supplier and/or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate



recommendations.

- B. Representative shall submit written report to Engineer listing observations and recommendations.

#### 1.8 TESTING LABORATORY SERVICES

- A. Owner will employ and pay for services of an Independent Testing Laboratory to perform inspections, tests, and other services wherever an Independent Testing Laboratory is required by individual specification sections listed in paragraph 1.2 above, unless otherwise indicated.
- B. Services will be performed in accordance with requirements of governing authorities and with specified standards.
- C. Reports will present observations and test results and indicate compliance or non-compliance with specified standards and with Contract Documents. Independent Testing Laboratory will submit one copy of each report directly to each of the following: Engineer, Resident Project Representative, Contractor. Reports will be mailed within 5 days of obtaining test results. If test results indicate deficiencies, Independent Testing Laboratory shall telephone or FAX results to Engineer, Resident Project Representative and Contractor within 24 hours.
- D. Contractor shall cooperate with Independent Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.
- E. Contractor shall coordinate all testing work and shall notify Engineer and Independent Testing Laboratory at least 24 hours prior to performing work requiring testing services. If scheduled tests or sampling cannot be performed because the work is not ready as scheduled, testing costs associated with the delay will be determined by Engineer and invoiced by Owner to Contractor. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price. If adequate notice is not provided, Contractor shall suspend work on that portion of the Project until testing can be performed. Such suspension will not be grounds for a claim against the Owner for delay, nor will it be an acceptable basis for an extension of time.
- F. Payment for Independent Testing Laboratory services shall be as follows:
  - 1. General: Where testing is the Owner's responsibility, payment will be made as stated below unless other requirements are given in Specification Sections. Testing which is the responsibility of the Contractor will be considered an incidental item unless otherwise indicated in Section 01150, Measurement and Payment.
  - 2. Initial Testing: Owner will pay for initial tests.
  - 3. Retesting: Costs of retesting due to non-compliance will be paid by Owner. The cost of retesting will be determined by Engineer and Owner will invoice Contractor for this cost. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price.
  - 4. Contractor's Convenience Testing: Inspections and tests performed for Contractor's convenience will be paid for by Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Provide and pay for all temporary applicable utilities required to properly perform the Work at no additional cost to the Owner including the placement and removal of the utilities.
2. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
3. Make all necessary applications and arrangements for electric power, light, water and other utilities with the local utility companies. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

B. All temporary utilities are subject to the approval of the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Electrical:

1. The General Contractor shall make necessary arrangements with the local power company for connection to the existing power supply and shall provide and pay for all temporary light and power requirements except as otherwise specified hereunder. In general, the temporary electrical service shall include all necessary switches, poles, wiring, cables, conduit, raceways, panelboards, fixtures, lamps and receptacles to supply construction power of adequate capacity for the project. Temporary transformers and meters shall be furnished and installed by the appropriate power authority, but paid for by the General Contractor, who shall be responsible for making all arrangements for their installation prior to using any existing power for temporary purposes.
2. The General Contractor will pay for the cost of energy consumed by all trades, including cost of lamp replacement. The General Contractor and Subcontractors of all trades shall furnish their own extension cords and such additional lamps as may be required for their work, shall pay for the cost of

temporary wiring of a special nature for light and power required, other than that above mentioned.

3. All temporary work shall be furnished and installed in conformity with the National Electrical Code and in accordance with local ordinances and requirements of the municipal power authority. All temporary wiring and accessories shall be removed after it has served its purpose.

B. Heating:

1. The General Contractor shall furnish, install, and maintain a complete temporary heating system, including fuel therefore, which will provide heat and ventilation as required by the trades and for the protection of stored and installed materials from injury as can be caused by dampness and cold. The General Contractor shall employ, within the terms of the General Contract, a competent watchman who will maintain and operate the systems, as required. The General Contractor shall bear all costs incurred from the temporary heating and ventilation from the time the systems are first required until the date of Substantial Completion of the General Contract, as defined in the General Conditions and Supplementary Conditions.

C. Water and Sanitary:

1. The General Contractor shall make necessary arrangements for connection to the municipal water supply and shall provide, at his own expense, any extensions as required for the operation of this project. The General Contractor shall bear all costs incurred for the temporary water services, including the costs of the water itself.
2. All lines, temporary or permanent, shall be protected and maintained by the General Contractor. Temporary lines shall be removed by the General Contractor when the temporary service is no longer required.
3. The General Contractor shall provide an adequate drinking water supply, satisfactorily cooled, for his employees.
4. See Site Plan for nearest water hook-up.
5. The General Contractor shall furnish, install, maintain and pay for adequate temporary chemical type toilet accommodations, for all persons employed on the work and located where approved by the Engineer. The accommodations shall be in proper enclosures and in accordance with Municipal Ordinances and shall be maintained in proper, safe and sanitary conditions and suitably heated when requested.
6. Relocate temporary toilet facilities as required to facilitate the construction.
7. Remove all temporary facilities at completion of work when directed by the Engineer.

## PART 3 - EXECUTION

### 3.1 PERFORMANCE

A. Electrical:

1. Provide electrical energy to:
  - a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.

- b. Construction site offices.
  - c. Lighting as required for safe working conditions at any location on the construction site.
  - d. Night security light.
  - e. When applicable, Owner's present facilities during the changeover of electrical equipment.
- 2. Capacity:
    - a. Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary, as specified herein.
  - 3. Installation:
    - a. Install all work with a neat and orderly appearance.
    - b. Have all installations performed by a qualified electrician.
    - c. Modify service as job progress requires.
    - d. Locate all installations to avoid interference with cranes and materials handling equipment, storage areas, traffic areas and other work.
- B. Heating:
- 1. Maintain a heated environment for the work at the temperature and for the length of time specified or as directed by the Engineer.
  - 2. Precaution:
    - a. Operate temporary heating apparatus in such a manner that finished work will not be damaged.
    - b. Repair all damage, caused by temporary heating operations, to the complete satisfaction of the Engineer.
- C. Water:
- 1. Provide and maintain water for drinking and construction purposes as required for the proper execution of the Work.
- D. Sanitary Accommodations:
- 1. Provide and maintain sanitary accommodations for the use of the employees of the General Contractor, subcontractors, and Engineer.
  - 2. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION

SECTION 01562DUST CONTROLPART 1 - GENERAL1.1 DESCRIPTIONS

## A. Work Included:

1. Contractor to have watering equipment on site throughout construction duration.
2. Furnish and apply water on the road surfaces within the construction site, at a minimum of two times per day, to control dust and when directed by the Engineer.
3. When dust control is not included as a separate item in the Contract, the work shall be considered incidental to the appropriate items of the Contract.

PART 2 - PRODUCTS2.1 MATERIALS

## A. Water for Sprinkling:

- B. Clean, free of salt, oil, and other injurious matter.

PART 3 - EXECUTION3.1 APPLICATION

## A. Water:

1. Apply water by methods approved by the Engineer.
2. Use approved equipment including a tank with gauge equipped pump and spray bar.

END OF SECTION

## SECTION 01570

### TRAFFIC REGULATION

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. Work Included:
  1. Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
  2. Perform all work in such a manner as to provide safe passage at all times for the public and with a minimum of obstruction to traffic.
  3. Do not close roads or streets to passage of the public without the permission of the proper authorities.
  4. Refer to Section 01010 Summary of Work for additional requirements.
- B. The local police department will decide if safe passage is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage.
- C. Minimize the length of delays or traffic stoppage to the extent practicable. Maximum traffic stoppage time shall be 10 minutes.

##### 1.2 SCHEDULING WORK

- A. Schedule all work so that two adjacent parallel streets are not closed to passage by the public at any one time, if at all possible.
- B. Revise the plan of work if it will create a traffic hazard or an unreasonably long detour. All detours shall be approved by the local police department.
- C. Do not start work in any new location without the permission of the Engineer.
- D. Notify all police and fire departments of all scheduled detours and when streets are reopened.

#### PART 2 - PRODUCTS

##### 2.1 WARNING SIGNS AND BARRICADES

- A. Provide adequate warning signs, barricades, signal lights, watchmen and take other necessary precautions for the safety of the public.
- B. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.
- C. Provide barricades of substantial construction and painted with a finish that increases visibility at night.
- D. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.
- E. Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.
- F. Traffic control signs for construction work shall be located and of the size and type as outlined in Manual on Uniform Traffic Control Devices for Streets and Highways as published by U. S. Department of Transportation.

2.2 UNIFORMED POLICE OFFICER

- A. A uniformed police officer is a police officer (local, county or state) on regular or special duty dressed in uniform with the necessary high visibility vest and apparel needed for traffic control.
- B. Arrange the police detail with the local Chief of Police, County Sheriff, or State Police Captain depending on jurisdiction.

2.3 FLAG PERSON

- A. A flag person is a trained and certified individual assigned specifically to the task of directing traffic and is outfitted in the necessary high visibility vest and apparel needed for traffic control.
- B. Flag persons shall be provided by the Contractor.

PART 3 - EXECUTION

3.1 DETOURS

- A. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel.
- B. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition.

3.2 INCONVENIENCE TO RESIDENTS OF VICINITY

- A. Whenever a traveled way is closed, perform the Work in such a manner that local travel and residents in the vicinity of the Work will be inconvenienced as little as possible.
- B. Allow access to residents and abutting land owners along the project to driveways and other normal outlets from their property.

3.3 TRAFFIC CONTROL OFFICERS

- A. Where required by the local, county or state police departments and/or when specified, traffic control officer shall be Uniformed Police Officers.
- B. Where the local, county or state police departments do not wish to or are unable to furnish traffic control officers and/or when specified, the traffic control officers shall be flag person.

END OF SECTION



SECTION 01710PROJECT CLEANINGPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Maintain premises, private, and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
2. At completion of work, remove waste materials, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturers.
- C. Mechanical sweeper – the sites shall be swept on a daily basis at the conclusion of each work day. Sweeping shall be performed by a mechanical power sweeper.

PART 3 - EXECUTION3.1 PERFORMANCE

## A. Cleaning During Construction:

1. Execute cleaning operations to ensure that buildings, grounds, private, and public properties are maintained free from accumulations of waste materials and rubbish.
2. Entirely remove and dispose of material or debris during the progress of the work that has washed into or has been placed in watercourses, ditches, lawns, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.
3. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
4. At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.
5. When applicable, schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

- B. Control of Hazards:
  - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
  - 2. Prevent accumulation of wastes which may create hazardous conditions.
  - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Disposal:
  - 1. Do not burn or bury rubbish and waste materials on project site.
  - 2. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
  - 3. Do not dispose of wastes into streams or waterways.
- D. Final Cleaning:
  - 1. Employ experienced workmen, or professional cleaners, for final cleaning.
  - 2. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight-exposed interior and exterior finished surfaces.
  - 3. Repair, patch and touch up marred surfaces to specified finishes.
  - 4. Rake clean non-paved surfaces of the project site.
  - 5. Restore to their original condition those portions of the site not designated for alterations by the Contract Documents.

END OF SECTION

SECTION 01720PROJECT RECORD DOCUMENTSPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Keep accurate record documents for all additions, substitutions of material, variations in work, and any other additions or revisions to the Contract.

1.2 MAINTENANCE OF DOCUMENTS

## A. Maintain at job site, one copy of:

1. Contract Drawings
1. Specifications
2. Addenda
3. Reviewed Shop Drawings
4. Change Orders
5. Any other modifications to the Contract
6. Field Test Reports

B. Store documents in files and racks specifically identified for this use that are apart from documents used for construction.

C. File documents in a logical manner indexed for easy reference.

D. Maintain documents in clean, dry, legible condition.

E. Do not use record documents for construction purposes.

F. Make documents available at all times for inspection by the Engineer and Owner, and by the end of the project, transmit these documents to the Engineer.

1.3 RECORDING

A. Label each document "PROJECT RECORD" in large high printed letters.

B. Keep record documents current and do not permanently conceal any work until required information has been recorded.

C. General Field Recording Issues:

1. All ties should be taken from existing, permanent features such as utility poles, corners of houses and hydrants. Porches, sheds or other house additions should be avoided for they could be torn down. A minimum of two ties should be taken.
2. Stations should be recorded to the nearest foot.
3. Inverts should be recorded to the nearest hundredth of a foot.
4. Elevations should be recorded to the nearest hundredth of a foot.
5. Building dimensions should be recorded to the nearest 1/4".

D. Project Record Drawings - Legibly mark Contract Drawings to record existing utilities and actual construction of all work, including but not limited to the following (where applicable):

1. Existing Utilities
  - a. Water mains and services, water main gate valves, sewer mains and

- services, storm drains, culverts, steam lines, gas lines, tanks and other existing utilities encountered during construction must be accurately located and shown on the Drawings. In congested areas supplemental drawings or enlargements may be required.
- b. Show any existing utilities encountered in plan and profile and properly labeled showing size, material and type of utility. Ties should be shown on plan. Utility should be drawn to scale in section (horizontally and vertically) and an elevation should be called out to the nearest hundredth of a foot.
  - c. When existing utility lines are broken and repaired, ties should be taken to these locations.
  - d. If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.
2. Manholes, Catch Basins, Valve Pits and other structures.
    - a. Renumber structure stationing to reflect changes.
    - b. Show ties to center of structure covers or hatches.
    - c. In general, show inverts at center of structures. However, for manholes with drop structures, or steep channels (greater than 0.2' change on slope), show inverts at face of manhole.
    - d. Show inverts for other structures at the face of the structure.
    - e. Draw any new structures that are added on plan and profile.
    - f. Show any field or office redesigns.
    - g. Redraw plan if the structure's location is moved more than 5 feet in any direction. [Note: It is important to show existing utilities, as outlined in Paragraph 1 above, especially if they were one reason for relocating the sewer, manholes and other structures.]
    - h. Redraw profile if inverts changed by more than 6 inches.
  3. Gravity Sewer Line
    - a. Change sewer line slopes indicated on Drawings if inverts are changed.
    - b. Draw any new gravity lines that are added on plan and profile.
    - c. Show any field or office redesigns.
    - d. Redraw the sewer line profile if manhole inverts are redrawn.
    - e. Redraw the sewer line on plan corresponding to relocated manholes.
  4. Water Mains and Force Mains
    - a. Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks should be recorded.
    - b. Revise elevations indicated on the Drawings to reflect actual construction.
  5. House Services
    - a. Draw all house services (even to empty lots) on plan, and show ties.
    - b. Show ties or distances to wyes from manhole.
    - c. Show chimneys heights in the profile.
    - d. The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record sewer service information. A copy of these forms should be provided to the Owner, along with the Record Drawing Set.
  6. Septic Tanks
    - a. Show ties to center of tank covers.

- b. Label size of septic tanks that are other than standard 1000 gallon capacity.
  - c. The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record septic tank information. A copy of these forms should be provided to the Owner, along with the Record Drawing Set.
7. Ledge
- a. Ledge profiles should be shown. Note whether the plotted ledge profile reflects undisturbed or expanded conditions.
8. Yard Piping and Buried Electrical Conduit
- a. Site piping should be drawn to reflect the installed locations, with ties and elevation of all bends (horizontal and vertical).
  - b. Show routing for electrical conduits and pull boxes, especially in close proximity to buildings and when the conduits change direction or cross process piping.
9. Roads
- a. Show centerline road profile and level spot elevations.
  - b. Show pavement widths.
  - c. On road cross sections, show the pavement cross slope.
  - d. Show any deviations from the design plans.
10. Buildings
- a. In general, small changes to structures should not be redrawn. If any dimensional changes were made in the field, the numerical change should be made on the Drawing and be properly labeled. Update dimensions and elevations on Drawings.
  - b. Show finished concrete elevations (top of slab, top of wall, top of footing, etc.). Redraw any foundation, frost wall, etc. that was modified, deepened, or altered during construction.
  - c. Adjust finished concrete horizontal dimensions that are shown on the Drawings.
  - d. Adjust structural steel elevations and horizontal dimensions that are shown on the Drawings.
  - e. Show location of anchors, construction and control joints, and waterstops, when they are different from those shown on Drawings.
  - f. Any additions or major changes should be shown in both plan and elevation (i.e. relocated doors, opposite door swings, change in wall location, relocation of floor drains).
  - g. Show approximate location and routing of electrical conduits in walls, slabs and ceilings. Most conduits are run in groups, therefore, use range of measurements to define location for entire section of conduits.
  - h. Special circuits for computers, alarms and instrumentation should be shown.
  - i. Show any changes in location and elevation of ductwork and devices, fuel piping and equipment, and heat piping and equipment.
  - j. Location of gravity sewer system below slabs in buildings should be shown, if changes are made in the configuration.
  - k. If wall mounted electrical switches, control boxes, thermostats, etc. have been relocated significantly, (other side of door, or to a wall other than

indicated diagrammatically on electrical plans) make the revision accordingly.

- E. Specifications and Addenda - Legibly mark up each section to record:
  - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
  - 2. Changes made by Change Order, Field Order, or other method.

#### 1.4 SUBMITTALS

- A. At the completion of the project, deliver record documents to the Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
  - 1. Date, project title and number.
  - 2. Contractor's name and address.
  - 3. Title and number of each record document with certification that each document is completed and accurate.
  - 4. Signature of Contractor, or his authorized representative.
- C. Failure to supply all information on the Project Record Drawings as specified in Part 1.3 may result in additional retainage from monthly partial payment requests, and in non-approval of final payments of the Contract and/or if contract time (as specified in accordance with the Standard General Conditions of the Construction Contract) has elapsed, this shall be grounds for the enactment of the liquidated damages as specified.

END OF SECTION

SECTION 02050ADEMOLITIONPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. The Contractor shall furnish all labor, materials, tools, equipment and apparatus necessary and shall do all work required to complete the demolition, removal, and alterations of existing facilities as indicated on the Drawings, as herein specified, and/or as directed by the Engineer.
2. Demolition and alteration work within occupied areas shall be accomplished with minimum interference to the occupants and to the plant which shall be in continuous operation during construction.
3. All equipment, piping, and other materials that are not to be relocated or to be returned to the Owner shall become the property of the Contractor and shall be disposed of by him, away from the site of the work and at his own expense.
4. All demolition or removal of existing structures, utilities, equipment, and appurtenances shall be accomplished without damaging the integrity of existing structures, equipment, and appurtenances to remain, to be salvaged for relocation or stored for future use.
5. Such items that are damaged shall be either repaired or replaced at the Contractor's expense to a condition at least equal to that which existed prior to the start of his work.
6. Unless otherwise indicated, all items labeled to be "removed", "demolished" or "remove/demolish" shall be removed and disposed of off site in accordance with all Local, State and Federal Regulations.

1.2 JOB CONDITIONS

## A. Condition of Structures:

1. The Owner assumes no responsibility for the actual condition of structures to be demolished.
2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as practicable. However, variations within the structures may occur due to Owner's removal and salvage operations prior to the start of demolition work (where applicable).

1.3 UTILITIES

## A. Utility Locations:

1. Utility locations shown on the plans are approximate only.
2. The Contractor shall make all necessary arrangements and perform any necessary work to the satisfaction of affected utility companies and governmental divisions involved with the discontinuance or interruption of affected public utilities and services.

1.4 SUBMITTALS

A. Schedule - Demolition:

1. Submit two (2) copies of proposed methods and operations of demolition to the Engineer for review prior to the start of work. Include in the schedule the coordination for shut-off, capping and continuation of utility services as required.
2. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations.
3. Provide detailed work plan including location of material disposal.

1.5 PROTECTIONS

- A. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons. Erect temporary, covered passageways as required by authorities having jurisdiction.
- B. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1.6 DAMAGES

- A. The Contractor shall promptly repair damages caused by demolition operations to adjacent facilities at no cost to the Owner.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Remove and dispose of non-salvageable material in accordance with all applicable local and state laws, ordinances and code requirements.
- B. Dispose of material daily as it accumulates.
- C. Carefully remove, store and protect from damage all materials to be salvaged.
- D. Buildings and Adjacent Property:
  1. Protect all buildings and property adjacent to equipment to be removed from damage by erecting suitable barriers or by other suitable means.
  2. Leave such buildings in a permanently safe and satisfactory condition.
- F. Mechanical/Process Demolition:
  1. Mechanical/Process demolition in general shall consist of the dismantling and removal of existing piping, tanks, pumps, motors, equipment and other appurtenances as specified, and indicated on the Drawings.
  2. It shall also include, where necessary, the cutting of existing piping for the purpose of making connections thereto.
  3. Piping not indicated to be removed but which may interfere with construction shall be removed to the nearest solid support, capped and left in place. Where



pipng that is to be removed passes through the wall of existing structures, it shall be cut off and properly capped on each side of the wall.

4. When piping is to be altered or removed underground, the remaining piping shall be properly capped or plugged.
  5. Abandoned underground piping shall be left in place unless it interferes with new structures or unless otherwise noted on the Drawings.
- H. Salvage:
1. Salvaged items shall be stored on site for the Owner in an acceptable location and manner.
- I. Demolition Sequence:
1. The demolition sequence is to conform the reviewed and approved project schedule, and restrictions outlined in Section 01310, Construction Schedules.

END OF SECTION

SECTION 02200EARTHWORKPART 1 - GENERAL1.1 DESCRIPTION

- A. The Work described by this Section consists of all earth work encountered and necessary for construction of the project as indicated in the Contract Documents, and includes but is not limited to the following:
1. Excavation
  2. Backfilling and Filling
  3. Compaction
  4. Embankment Construction
  5. Grading
  6. Providing soil material as necessary
  7. Disposal of excess suitable material and unsuitable materials

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
1. All work shall be performed and completed in accordance with all local, state and federal regulations.
  2. The General Contractor shall secure all other necessary permits unless otherwise indicated from, and furnish proof of acceptance by, the municipal and state departments having jurisdiction and shall pay for all such permits, except as specifically stated elsewhere in the Contract Documents.
- B. Line and Grade:
1. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain same to properly perform the work.
- C. Testing Methods:
1. Gradation Analysis: Where a gradation is specified the testing shall be in accordance with ASTM C-117-90 and ASTM C-136-93 (or latest revision).
  2. Compaction Control:
    - a) Unless otherwise indicated, wherever a percentage of compaction for backfill is indicated or specified, it shall be the in-place density divided by the maximum density and multiplied by 100. The maximum density shall be the density at optimum moisture as determined by ASTM Standard Methods of Test for Moisture-Density Relations of Soil Using 10-lb. Hammer and 18-in. Drop, Designation D-1557-91 (Modified Proctor), or latest revision, unless otherwise indicated.
    - b) The in-place density shall be determined in accordance with ASTM Standard Method of Test for Density of Soil in Place by the Sand Cone method, Designation D 1556-90, (or latest revision) or Nuclear method Designation D2922.

- c) Wherever specifically indicated, maximum density at optimum moisture may be determined by ASTM Standard Methods of Test for Moisture Density Relations of Soils, ASTM D-698-91 (Standard Proctor).
- d) An Independent Testing Laboratory will be retained by the Owner to conduct all laboratory and field soil sampling and testing, and to observe earth work and foundation construction activities. Laboratory testing will consist of sieve analyses, natural water content determinations, and compaction tests. Field testing will consist of in-place field density tests and determination of water contents.

### 1.3 SUBMITTALS

- A. Collection of samples and testing of all materials for submittals shall be performed by the Independent Testing Laboratory and paid for by the Owner.
- B. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.
- C. Submit test results (including gradation analysis) and source location for all borrow material to be used at least 10 working days prior to its use on the site. Contractor shall identify and provide access to borrow sites.
- D. Submit moisture density curve for each type of soil (on site or borrow material) to be used for embankment construction or fill beneath structures or pavement.
- E. Submit Soils Management Plan detailing procedures for handling suitable and unsuitable materials.

### 1.4 TESTS

The Independent Testing Laboratory shall conform to the following procedures and standards:

- A. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.
- B. Field density tests on embankment materials shall be as follows:
  - 1. Tests shall be taken on every 200 cubic yards of embankment material.
- C. Paved Areas: Make at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2,000 sq. ft. of overlying building slab or paved area, but in no case less than 3 tests.
- D. Trenches: Field density test in trenches shall be taken at 75 linear foot intervals on every third lift.
- E. In addition to the above tests the Independent Testing Laboratory may perform additional density tests at locations and times requested by the Engineer.
- F. Additional density testing will be required by the Engineer if the Engineer is not satisfied with the apparent results of the Contractor's compaction operation.
  - 1. If the test results fail to meet the requirements of these specifications, the Contractor shall undertake whatever action is necessary, at no additional cost to the Owner, to obtain the required compaction. The cost of retesting will be paid by Contractor.

2. If the test results pass and meet the requirements of these Specifications, the cost of the testing service will be borne by the Owner, but no allowance will be considered for delays in the performance of the work.

1.5 JOB CONDITIONS

A. Site Information:

1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner and Engineer will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Data are made available for the convenience of Contractor.
2. Additional test borings and other exploratory operations may be made by Contractor at no additional cost to Owner.

B. Existing Utilities and Structures:

1. The locations of utilities and structures shown on the Drawings are approximate as determined from physical evidence on or above the surface of the ground and from information supplied by the utilities. The Engineer in no way warranties that these locations are correct. It shall be the responsibility of the Contractor to determine the actual locations of any utilities or structures within the project area.

PART 2 - PRODUCTS

2.1 SOIL MATERIAL

A. Aggregate Base and Subbase (M1.03.0 and M1.03.1 or M2.01.7):

Gravel Borrow (M1.03.0) for aggregate base shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings, and deleterious materials. Gradation requirements for gravel shall conform to the following:

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
½ in.	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

Maximum size of stone in gravel shall be as follows:

M1.03.0 Type a	6 inches largest dimension
M1.03.0 Type b	3 inches largest dimension
M1.03.0 Type c	2 inches largest dimension

Processed Gravel (M1.03.1) or Dense-Graded Crushed Stone for subbase shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. Gradation shall meet the following requirements:

Processed Gravel (M1.03.1)

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
3 inch	100
1 ½ inch	70-100
1 ¼ inch	50-85
No. 4	30-60
No. 200	0-10

Dense-Graded Crushed Stone (M2.01.7)

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
2 inch	100
1 ½ inch	70-100
¾ inch	50-85
No. 4	30-55
No. 50	8-24
No. 200	3-10

The approved source of bank-run gravel material shall be processed by mechanical means. The equipment for producing crushed gravel shall be of adequate size and with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

- B. Aggregate Leveling Course and Untreated Surface Course: Shall be screened or crushed gravel consisting of hard durable particles which are free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of the material shall meet the grading requirements of the following table:

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
1 inch	95-100
¾ inch	90-100
No. 4	40-65
No. 10	10-45
No. 200	0-7

- C. Common Borrow: Shall consist of approved material required for the construction of the work where designated. Common borrow shall be free from frozen material, perishable rubbish, peat, organic, and other unsuitable material.

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
6 inch	100
No. 200	0-50

- D. ½ Inch Crushed Stone (M2.01.1 and M2.01.2):  
Crushed stone shall consist of durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from detrimental quantity of thin, flat, elongated or other objectionable pieces. A detrimental quantity will be considered as any amount in excess of 15% of the total weight. The crushed stone shall be reasonably free from clay, loam or deleterious material. The crushed stone shall be uniformly blended according to the following grading requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
2 inch	100
1 ½ inch	95-100
1 inch	35-70
¾ inch	0-25

- E. ¾ Inch Screened Stone (M2.01.4):  
Screened stone shall consist of durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from detrimental quantity of thin, flat, elongated or other objectionable pieces. A detrimental quantity will be considered as any amount in excess of 15% of the total weight. The screened stone shall be reasonably free from clay, loam or deleterious material. The screened stone shall be uniformly blended according to the following grading requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
1 inch	100
¾ inch	90-100
½ inch	10-50
3/8 inch	0-20
No. 4	0-5

- F. Select Fill: Shall consist of well graded granular material free of organic material, loam, wood, trash, snow, ice, frozen soil and other objectionable material and having no rocks with a maximum dimension of over 4 inches and meeting the

following gradation requirements, except where it is used for pipe bedding in which case the maximum size shall be 2 inches.

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
4 inch	100
3 inch	90-100
½ inch	25-90
No. 40	0-30
No. 200	0-5

- G. Sand Borrow (M1.04.0): Sand borrow shall consist of clean inert, hard, durable grains of quartz or other hard durable rock, free from loam or clay, surface coatings and deleterious materials. The maximum particle size for Sand Borrow shall be as follows:

M1.04.0 Type a	1/4 inch
M1.04.0 Type b	3/8 inch

## 2.2 FILTER FABRIC

- A. Refer to Section 02260.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine the areas and conditions under which excavating, backfilling, filling, compaction and grading are to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

### 3.2 EXCAVATION

- A. General:

1. Excavation consists of removal and disposal of all material encountered when establishing line and grade elevations required for execution of the work.
2. The Contractor shall make excavations in such manner and to such widths as will give suitable room for laying and jointing the piping; shall furnish and place all sheeting, sandbags, bracing, and supports; shall do all cofferdamming, pumping, and draining; and shall render the bottom of the excavations firm, dry and acceptable in all respects.
3. All excavation shall be classified as either earth or ledge.
  - a) Earth Excavation shall consist of the removal, hauling and disposal of all earth materials encountered during excavation including but not limited to native soil or fill, pavement (bituminous or concrete), existing sewers

- and manholes, ashes, loam, clay, swamp muck, debris, soft or disintegrated rock or hard pan which can be removed with a backhoe, or a combination of such materials, and boulders measuring less than one cubic yard.
- b) Ledge Excavation: Shall consist of the removal, hauling, and disposal of all ledge or rock encountered during excavation. "Ledge" and "rock" shall be defined as any natural compound, natural mixture that in the opinion of the Engineer can be removed from its existing position and state only by drilling and blasting, wedging, sledging, boring or breaking up with power operated tools. No boulder, ledge, slab, or other single piece of excavated material less than one cubic yard in total volume shall be considered to be rock unless, in the opinion of the Engineer it must be removed from its existing position by one of the methods mentioned above.
4. The Contractor shall not have any right of property in any materials taken from any excavation. Do not remove any such materials from the construction site without the approval of the Engineer. This provision shall in no way relieve the Contractor of his obligations to remove and dispose of any material determined by the Engineer to be unsuitable for backfilling. The Contractor shall dispose of unsuitable and excess material in accordance with the applicable sections of the Contract Documents.
- B. Additional Excavation: When excavation has reached required subgrade elevations, notify the Engineer and Resident Project Representative who will observe the conditions.
- 1. If material unsuitable for the structure or paved area or pipeline (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill, screened stone, crushed stone, or concrete as directed by the Engineer.
  - 2. All excavated materials designated by the Engineer as unsuitable shall become the property of the Contractor and disposed of at locations in accordance with all State and local laws and the provisions of the Contract Documents.
- C. Unauthorized Excavation: Shall consist of removal of materials beyond indicated subgrade elevations or dimensions without specific authorization of Engineer. Unauthorized excavation, as well as remedial work required by the Engineer shall be at the Contractor's expense. Remedial work required is as follows:
- 1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with select fill or screened stone compacted to 95%. Provide 12" minimum select fill or screened stone directly under footings. Concrete fill may be used to bring elevations to proper position, when acceptable to Engineer.
  - 2. If the bottom of a trench is excavated beyond the limits indicated, backfill the resulting void with thoroughly compacted screened stone, unless otherwise indicated.



3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.
- D. Structural Excavation:
1. Shall consist of the removal, hauling, disposal, of all material encountered in the excavation to permit proper installation of structures.
  2. Excavations for structures shall be carried to the lines and subgrades shown on the Drawings.
  3. Excavate areas large enough to provide suitable room for building the structures.
  4. The extent of open excavation shall be controlled by prevailing conditions subject to any limits designated by the Engineer.
  5. Provide, install, and maintain sheeting and bracing as necessary to support the sides of the excavation and to prevent any movement of earth which could diminish the width of the excavation or otherwise injure the work, adjacent structures, or persons and property in accordance with all state and OSHA safety standards.
  6. Erect suitable fences around structure excavation and other dangerous locations created by the work, at no additional cost to the Owner.
  7. Exposed subgrade surfaces shall remain undisturbed, protected, and maintained as uniform, plane areas and shape to receive the foundation components of the structure.
    - a. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
    - b. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade and trim bottoms to required lines and grades to leave solid base to receive the structure.
    - c. If a structure is to be constructed within the embankment, the fill shall first be brought to a minimum of 3 feet above the base of the footing. A suitable excavation shall then be made as though the fill were undisturbed earth.
- E. Trench Excavation: Shall consist of removal, hauling and disposal of all material encountered in the excavation to the widths and depths shown on the Drawings to permit proper installation of underground utilities.
1. Excavate trenches to the uniform width shown on the Drawings sufficiently wide to provide sufficient space for installation, backfilling, and compaction. Every effort should be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
  2. Trenches shall be excavated with approximately vertical sides between the elevation of the center of the pipe and an elevation one foot above the top of the pipe.

3. Grade bottoms of trenches as indicated for pipe and bedding to establish the indicated slopes and invert elevations, notching under pipe joints to provide solid bearing for the entire body of the pipe, where applicable.
  4. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least two feet above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall be excavated as though in undisturbed material.
  5. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end of sewer and storm lines and proceed upgrade.
  6. Perform excavation for force mains and water mains in a logical sequence.
  7. The extent of open excavation shall be controlled by prevailing conditions subject to any limits prescribed by the Engineer.
  8. As the excavation progresses, install such shoring and bracing necessary to prevent caving and sliding and to meet the requirements of the state and OSHA safety standards, as outlined in the appropriate section of this Specification.
- F. Protection of Persons, Property and Utilities:
1. Barricade open excavations occurring as part of this work and post with warning lights in compliance with local and State regulations.
  2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Exercise extreme caution and utilize sheeting, bracing, and whatever other precautionary measures that may be required.
  3. Rules and regulations governing the respective utilities shall be observed in execution of all work. Active utilities and structures shall be adequately protected from damage, and removed or relocated only as indicated or specified. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged or capped only with written authorization of the utility owner. Report in writing to the Engineer, the locations of such abandoned utilities. Extreme care shall be taken when performing work in the vicinity of existing utility lines, utilizing hand excavation in such areas, as far as practicable.
  4. Repair, or have repaired, all damage to existing utilities, structures, lawns, other public and private property which results from construction operations, at no additional expense to the Owner, to the complete satisfaction of the Engineer, the utility, the property owner, and the Owner.
- G. Use of Explosives:
1. Do not bring explosives onto site or use in work without prior written permission from authorities having jurisdiction. Contractor is solely responsible for handling, storage, and use of explosive materials when their use is permitted.

2. All blasting shall be performed in accordance with all pertinent provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
- H. Stability of Excavations:
1. Slope sides of excavations to comply with all codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
  2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- I. Shoring and Bracing:
1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
  2. Provide trench shoring and bracing to comply with local codes and authorities having jurisdiction.
  3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Install shoring and bracing as excavation progresses.
- J. Material Storage:
1. Stockpile excavated materials which are satisfactory for use on the work until required for backfill or fill. Place, grade and shape stockpiles for proper drainage and protect with temporary seeding or other acceptable methods to control erosion.
  2. Locate and retain soil materials away from edge of excavations.
  3. Dispose of excess soil material and waste materials as herein specified.
- K. Dewatering:
1. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to intercept and/or remove promptly and dispose properly of all water entering trenches and other excavations (including surface and subsurface waters).
  2. Excavations shall be kept dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.
- L. Cold Weather Protection:
1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.
  2. No frozen material shall be used as backfill or fill and no backfill shall be placed on frozen material.
- M. Separation of Surface Material:
1. The Contractor shall remove only as much of any existing pavement as is necessary for the prosecution of the work.
  2. Prior to excavation, existing pavement shall be cut, where in the opinion of the Engineer, it is necessary to prevent damage to the remaining road surface.
  3. Where pavement is removed in large pieces, it shall be disposed of before proceeding with the excavation.

4. From areas within which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.

N. Dust Control:

1. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets, staging areas, all other areas as necessary, so as to minimize the creation and dispersion of dust. Refer to Specification Section 01562.
2. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the contractor shall furnish and spread the material, as directed.

3.3 BACKFILL AND FILL

A. General:

1. Backfilling shall consist of replacing material removed to permit installation of structures or utilities, as indicated in the Contract Documents.
2. Filling shall consist of placing material in areas to bring them up to grades indicated on the Drawings.
3. The Contractor shall provide and place all necessary backfill and fill material, in layers to the required grade elevations.
4. Backfill excavations as promptly as work permits, but not until completion of the following:
  - a. Acceptance by Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
  - b. Inspection, approval, and recording locations of underground utilities.
  - c. Removal of concrete formwork.
  - d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Temporary sheet piling driven below bottom of structures shall be removed in manner to prevent settlement of the structure or utilities, or cut off and left in place if required.
  - e. Removal of trash and debris.
  - f. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
  - g. Density testing having results meeting requirements specified herein.
5. In general, and unless otherwise indicated, material used for backfill of trenches and excavations around structures shall be suitable excavated material which was removed in the course of making the construction excavation. Unless otherwise specified or allowed by the Engineer the backfill and fill shall be placed in layers not to exceed 8 inches in thickness.
6. All fill and backfill under structures and pavement, and adjacent to structures, shall be compacted crushed stone or select fill as specified or as indicated on

the Drawings. The fill and backfill materials shall be placed in layers not exceeding 12 inches in thickness.

7. Suitable excavated material shall meet the following requirements:
    - a. Free from large clods, silt lumps or balls of clay.
    - b. Free from stones and rock fragments with larger than 12 inch max. dimension.
    - c. Free from organics, peat, etc.
    - d. Free from frozen material.
  8. If sufficient suitable excavated material is not available from the excavations, and where indicated on the Drawings, the backfill material shall be select fill or common borrow, unless otherwise indicated, as required and as directed by the Engineer.
  9. Do not backfill with, or on, frozen materials.
  10. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
  11. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet.
  12. Do not continue backfilling until the previously placed and new materials have dried sufficiently to permit proper compaction.
  13. The nature of the backfill materials will govern the methods best suited for their placement and compaction. Compaction methods and required percent compaction is covered in Compaction section.
  14. Before compaction, moisten or aerate each layer as necessary to provide a water content necessary to meet the required percentage of maximum dry density for each area classification specified.
  15. Do not allow large masses of backfill material to be dropped into the excavation in such a manner that may damage pipes and structures.
  16. Place material in a manner that will prevent stones and lumps from becoming nested.
  17. Completely fill all voids between stones with fine material.
  18. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
  19. Deposit backfill and fill material evenly on all sides of structures to avoid unequal soil pressures.
  20. Keep stones or rock fragments with a dimension greater than two inches at least one foot away from the pipe or structure during backfilling.
  21. Leave sheeting in place when damage is likely to result from its withdrawal.
  22. Completely fill voids left by the removal of sheeting with screened stone which is compacted thoroughly.
- B. Pipe Bedding, Initial Backfill and Trench Backfill
1. Place bedding and backfill in layers of uniform thickness specified herein, and as shown on the Drawings.
  2. Thoroughly compact each layer by means of a suitable vibrator or mechanical tamper.

3. Install pipe bedding and initial backfill in layers of uniform thickness not greater than eight (8) inches.
4. Deposit the remainder of the backfill in uniform layers not greater than eight inches.
5. Provide underground sewer marking tape for the full length of sewer trenches as shown on the Drawings. Marking tape shall be SETON #210 SEW or equivalent.
6. Where soft silt and clay soils are encountered the trench shall be excavated six inches below the normal bedding and backfilled with 6-inches of compacted sand.
7. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and which are carried below the bottom of such footings, or which pass under wall footings. Place concrete to the level of the bottom of adjacent footings.
8. The following schedule gives the bedding requirements for various types of pipe. Distances refer to vertical thickness below the pipe.

#### BEDDING REQUIREMENTS

DI or Concrete Pipe                      6 inches min. below to 6" above top of pipe

PVC, CMP or HDPE Pipe                6 inches min. below to 6" above top of pipe

9. The following schedule gives the initial backfill requirements for various types of pipes.

#### INITIAL BACKFILL REQUIREMENTS

DI or Concrete,  
Pipe     $\frac{3}{4}$  inch Screened stone or select fill 12 inches  
min. over top of pipe.

PVC, CMP or PE  
Pipe    12 inches min.  $\frac{3}{4}$  inch screened stone  
over the top of the pipe.

10. Special bedding and backfill requirements shown on the Drawings supersede requirements of this section.
  11. Where pipes or structures pass through or under the impervious core of the lagoon embankments, bedding and backfill material shall consist of the impervious embankment material. Extra care should be given to properly and thoroughly compact the bedding material around the pipe.
- C. Improper Backfill:
1. When excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.

2. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.
  3. Excavation, backfilling, and compacting work performed to correct improper backfilling shall be performed at no additional cost to the Owner.
- D. Ground Surface Preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, scarify or break-up sloped surface steeper than 1 vertical to 4 horizontal.
  2. When existing ground surface has a density less than that specified under "compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

### 3.4 COMPACTION:

- A. General:
1. Control soil compaction during construction to provide not less than the minimum percentage of density specified for each area classification.
- B. Percentage of Maximum Density Requirements:
1. Compact soil to not less than the following percentages of maximum dry density determined in accordance with ASTM D1557 as indicated.
    - a. Structures: Compact each layer of backfill or fill material below or adjacent to structures to at least 95% of maximum dry density (ASTM D1557).
    - b. Walkways: Compact each layer of backfill or fill material to at least 93% of maximum dry density (ASTM D1557).
    - d. Roadways, Drives and Paved Areas: Compact each layer of fill, subbase material, and base material to at least 95% of maximum dry density (ASTM D1557).
    - e. Pipes: Compact bedding material and each layer of backfill to at least 90% maximum dry density (ASTM D1557). Where backfilling with excavated material, compact to native field density.
    - f. Embankments: Compact each layer of embankment material to at least 95% of maximum dry density (ASTM D1557).
- C. Moisture Control:
1. Where subgrade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, in quantities controlled to prevent free water appearing on surface during or subsequent to compaction operations.
  2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
  3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory level.

D. Embankment Compaction:

1. After each embankment layer has been spread to the required maximum 8-inch thickness and its moisture content has been adjusted as necessary, it shall be rolled with a sufficient number of passes to obtain the required compaction. One pass is defined as the required number of successive trips which by means of sufficient overlap will insure complete coverage and uniform compaction of an entire lift. Additional passes shall not be made until the previous pass has been completed.
2. When any section of an embankment sinks or weaves excessively under the roller or under hauling units and other equipment, it will be evident that the required degree of compaction is not being obtained and that a reduction in the moisture content is required. If at any place or time such sinking and weaving produces surface cracks which, in the judgment of the Engineer are of such character, amount, or extent to indicate an unfavorable condition, he will recommend operations on that part of the embankment to be suspended until such time as it shall have become sufficiently stabilized. The ideal condition of the embankment is that attained when the entire embankment below the surface being rolled is so firm and hard as to show only the slightest weaving and deflection as the roller passes.
3. If the moisture content is insufficient to obtain the required compaction, the rolling shall not proceed except with the written approval of the Engineer, and in that event, additional rolling shall be done to obtain the required compaction. If the moisture content is greater than the limit specified, the material of such water content may be removed and stockpiled for later use or the rolling shall be delayed until such time as the material has dried sufficiently so that the moisture content is within the specified limits. No adjustment in price will be made on account of any operation of the Contractor in removing and stockpiling, or in drying the materials or on account of delays occasioned thereby.
4. If because of insufficient overlap, too much or too little water, or other cause attributable to defective work, the compaction obtained over any area is less than that required, the condition shall be remedied, and if additional rollings are ordered, they will be done at no cost to the Owner. If the material itself is unsatisfactory or if additional rolling or other means fails to produce satisfactory results, the area in question shall be removed down to material of satisfactory density and the removal, replacement, and re-rolling shall be done by the Contractor, without additional compensation.
5. Material compaction by hand-operated equipment or power-driven tampers shall be spread in layers not more than 6 inches thick. The degree of compaction obtained by these tamping operations shall be equal in every respect to that secured by the rolling operation.

E. Compaction Methods: The Contractor may select any method of compaction that is suitable to compact the material to the required density.

1. General: Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between



stones shall be completely filled with fine material. All voids left by the removal of sheeting shall be completely backfilled with suitable materials and thoroughly compacted.

2. Tamping or Rolling: If the material is to be compacted by tamping or rolling, the material shall be deposited and spread in uniform, parallel layers not exceeding the uncompacted thicknesses specified. Before the next layer is placed, each layer shall be tamped as required so as to obtain a thoroughly compacted mass. Care shall be taken that the material close to the excavation side slopes, as well as in all other portions of the fill area, is thoroughly compacted. When the excavation width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe or structure, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar powered equipment instead of by tamping. For compaction by tamping or rolling, the rate at which backfilling material is deposited shall not exceed that permitted by the facilities for its spreading, leveling, and compacting as furnished by the Contractor.
- F. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

### 3.5 GRADING

#### A. General:

1. Grading shall consist of that work necessary to bring all areas to the final grades.
2. Uniformly grade areas within limits of work requiring grading, including adjacent transition areas.
3. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

#### B. Compaction:

1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

#### C. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

### 3.6 BASE COURSE AND LEVELING COURSE

#### A. General:

1. Base course consists of placing the specified materials in layers to support a leveling course or paved surface, as indicated in the Drawings.

- B. Grade Control:
  - 1. During construction, maintain lines and grades including crown and cross-slope of base course and leveling course.
- C. Placing:
  - 1. Place base course on prepared subbase conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting base materials.
  - 2. Place leveling course on prepared base course, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compaction.
- D. Shaping and Compacting:
  - 1. All layers of aggregate base course and leveling course shall be compacted to the required density immediately after placing. As soon as the compaction of any layer has been completed, the next layer shall be placed.
  - 2. The Contractor shall bear full responsibility for and make all necessary repairs to the base leveling courses and the subgrade until the full depth of the base leveling courses is placed and compacted. Repairs shall be made at no additional cost to the Owner.
  - 3. If the top of any layer of the aggregate base or leveling course becomes contaminated by degradation of the aggregate or addition of foreign materials, the contaminated material shall be removed and replaced with the specified material at the Contractor's expense.

END OF SECTION

SECTION 02260FILTER FABRICPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Furnish all materials and install filter fabric of the types, dimensions and in the location(s) shown on the Drawings and specified herein.

1.2 QUALITY ASSURANCE

- A. A competent laboratory must be maintained by the manufacturer of the fabric at the point of manufacture to insure quality control.
- B. During all periods of shipment and storage, the fabric shall be wrapped in a heavy duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, and temperatures greater than 140°F, mud, dirt, dust and debris.

1.3 SUBMITTALS

- A. Manufacturer shall furnish certified test reports with each shipment of material attesting that the fabric meets the requirements of this Specification.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Filter fabric for use in stabilization, drainage, underdrains, erosion control, landscaping and beneath structures shall be formed in widths of not less than six (6) feet and shall meet the requirements below. Both woven and non-woven geotextiles are acceptable where applicable; however, "slit-tape" woven fabrics will not be permitted for drainage, underdrain, and erosion control applications. The geotextile shall have property values expressed in "MARV" values that meet or exceed the values stated in the tables below as determined by the most recent test methods specified above. Filter fabric for use in underdrains and beneath structures shall be Mirafi 140 by Fiber Industries or equal.

Table 1 (Underdrain and Tank Subgrade)

<u>Geotextile Mechanical Property</u>	<u>Test Method</u>	<u>Minimum Permissible Value</u>
Grab Tensile Strength (both directions)	ASTM D4632	205 pounds
Grab Elongation	ASTM D4632	50 percent
Mullen Burst Strength	ASTM D3786	350 psi
Puncture Strength	ASTM D4833	110 pounds
Trapezoid Tear Strength	ASTM D4533-85	85 pounds
Water Flow Rate	ASTM D4491	110 gal/min/sf
Equivalent Opening Size (EOS)	ASTM D4751	80
Coefficient of Permeability	ASTM D4491	0.38 cm/sec

C. Silt Fence (woven or unwoven fabric)

Table 2 (Silt Fence)

<u>Geotextile Mechanical Property</u>	<u>Test Method</u>	<u>Minimum Permissible Value</u>
Grab Tensile Strength (both directions)	ASTM D4595-86	120 pounds
Grab Elongation	ASTM D4632-86	50 percent
Mullen Burst Strength	ASTM D3786-87	210 psi
Puncture Strength	ASTM D3787	60 pounds
Trapezoid Tear Strength	ASTM D4533-85	50 pounds
Water Flow Rate	ASTM D4491-85	120 gal/min/sf
Equivalent Opening Size (EOS)	ASTM D4751	80
Coefficient of Permeability	ASTM D4491-85	0.2 cm/sec

The geotextile shall meet or exceed the "typical" values stated above as determined by the most recent test methods specified above.

- D. Filter Fabric for use in siltation fencing shall be the following:
1. Environfence 100X (Mirafi)
  2. Supac 4NP (Phillip 66)
  3. Exxon 180 Siltfence
  4. Amoco 1380 Silt Stop
  5. Harris Siltfence
  6. Or equivalent

### PART 3 - EXECUTION

#### 3.1

- A. Install filter fabric as shown on the drawings or as directed in appropriate specifications in this division or in accordance with manufacturer's instructions or as directed by the Engineer.
- B. Underdrain filter fabric (geotextile) shall be placed over and around the crushed stone dewatering layer at the locations shown in the Drawings or as directed by the Engineer. The fabric shall be placed on crushed stone subgrade. Filter fabric (geotextile) shall be placed with the long dimension parallel to the underdrain piping unless otherwise directed by the Engineer. Filter fabric (geotextile) shall be overlapped parallel to the underdrain piping.
- C. (All applications) At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage. The filter fabric shall be unrolled and laid smooth and free of tension, stress, folds, wrinkles, or creases except, in curved sections and corners. Filter fabric (geotextile) shall be overlapped a minimum width of 6 inches at each joint. Overlap joints and seams shall be measured as a single layer of cloth. All filter fabric (geotextile) shall be turned down at all exterior limits. Filter fabric (geotextile) overlaps shall be field sewn using UV resistant thread with seam material properties the same as the material with contrasting color, have a stitch density of 4 to 6 stitches/foot of seam and a double row of lock stitches. Heat bonding of the seams along the edges is an acceptable alternative, except over underdrains; heat bonding of seams is not an acceptable alternative to seaming filter fabric.

END OF SECTION

SECTION 02270

TEMPORARY EROSION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The work under this section shall include provision of all labor, equipment, materials and maintenance of temporary erosion control devices, as specified herein, as shown on the Drawings and as directed by the Engineer.
2. Erosion control measures shall be provided as necessary to correct conditions that develop prior to the completion of permanent erosion control devices, or as required to control erosion that occurs during normal construction operations.
3. Construction operations shall comply with all federal, state and local regulations pertaining to erosion control.
4. Erosion control measures shall be in accordance with the Massachusetts Department of Environmental Protection's - Stormwater Management Standards - (referred to hereafter as MassDEP SMS) and "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas," *Franklin, Hampden, Hampshire Conservation Districts, 2003*.
5. After awarding of or after being awarded the Contract, prior to commencement of construction activities, the Contractor will meet with the Engineer to discuss erosion control requirements and develop a mutual understanding relative to details of erosion control.

B. Design Criteria:

1. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
2. Stabilize disturbed earth surfaces in the shortest time and employ such temporary erosion control devices, as may be necessary, until such time as adequate soil stabilization has been achieved.

1.2 SUBMITTALS

- A. The Contractor shall furnish the Engineer, in writing, his work plan giving proposed locations for storage of topsoil and excavated material, before beginning construction. A schedule of work shall accompany the work plan. Acceptance of this plan will not relieve the Contractor of his responsibility for completion of the work as specified.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Fiber Rolls:
  - 1. The owner has a preference for fiber rolls (a.k.a. straw wattles) over hay bales for erosion control. Fiber rolls shall be minimum 9-inch diameter cylinders of agricultural straw or rice straw wrapped in photodegradable black synthetic netting.
- B. Silt Fencing
  - 1. Polyethylene, polypropylene, nylon, or polyester fabric supported by stakes spaced no greater than 6-feet apart.
- C. Silt Sacks:
  - 1. Silt Sacks (or equivalent) shall be placed in downgradient catch basins to prevent sediment from entering the drainage system. Silt sacks shall be periodically cleaned while in use and must be cleaned prior to and after precipitation events. Applicants are advised they may be required to respond immediately for repair and maintenance at the request of the Town within two hours of notification.
- D. Mulches:
  - 1. Straw or Salt Marsh Hay. Loose hay mulching is prohibited.
- E. Mats and Nettings:
  - 1. Twisted Craft paper, yarn, jute, excelsior wood fiber mats, glass fiber and plastic film.
  - 2. Type and use shall be as specified in the SMS.
- F. Baled Straw:
  - 1. At least 14" by 18" by 30" securely tied to form a firm bale, staked as necessary to hold the bale in place.
- G. Sand Bags:
  - 1. Heavy cloth bags of approximately one cubic foot capacity filled with sand or gravel.
- H. Permanent Seed:
  - 1. Conservation mix appropriate to the predominant soil conditions as specified in the SMS and subject to approval by the Engineer.
- I. Temporary Seeding:
  - 1. Use species appropriate for soil conditions and season as specified in the SMS and subject to approval by the Engineer.
- J. Water:
  - 1. The Contractor shall provide water and equipment to control dust, as directed by the Engineer.
- K. Filter Fabrics:
  - 1. Filter fabric shall be of one of the commercially available brands such as Mirafi, Typar or equivalent. Fabric types for particular applications shall be approved by the Engineer prior to installation.

2.2 CONSTRUCTION REQUIREMENTS

- A. Temporary Erosion Checks:
  - 1. Temporary erosion checks shall be constructed in ditches and other locations as necessary.
  - 2. Fiber rolls or siltation fence may be used in an arrangement to fit local conditions.
- B. Temporary Berms:
  - 1. Temporary barriers shall be constructed along the toe of embankments when necessary to prevent erosion and sedimentation.
- C. Temporary Seeding:  
 Areas to remain exposed for a time exceeding 3 weeks shall receive temporary seeding as indicated below:

Season	Seed	Rate
April 1 to June 1 Aug. 15 to Sept. 15	Annual Ryegrass	40 lbs/Acre
May 1 to June 30	Foxtail Millet	30 lbs/Acre
April 1 to July 1 Aug. 15 to Sept. 15	Oats	80 lbs/Acre
Aug. 15 to Oct. 15	Winter Rye	120 lbs/Acre
Nov. 1 to April 1	Mulch w/ dormant seed	80 lbs/Acre @ 50% seed rate increase

- D. Mulch All Areas Receiving Seeding:  
 Use either wood cellulose fiber mulch (750 lbs/acre); or straw mulch with chemical tack (as per manufacturer's specifications). Wetting for small areas may be permitted. Biodegradable netting is recommended in areas to be exposed to drainage flow.
- E. Erosion control matting for slopes and ditches shall be anchored with pegs and/or staples per manufacturer's recommendations. Contractor shall provide matting along the flowline of all ditches and swales having a longitudinal slope in excess of 0.01 ft/ft, and on all slopes in excess of 3(H) to 1(V).
- F. Gravel aprons shall be installed at the entrance of construction sites where disturbance is over 4,000 square feet to prevent sediment from the construction site entering the roadway. Aprons shall be a minimum of 15 feet in length, and extend the width of the entrance.

PART 3 - EXECUTION

3.1 INSTALLATION



- A. Fiber Rolls (Straw Wattles):  
Fiber rolls shall be staked securely into the ground and oriented perpendicular to the slope using wood stakes. A minimum of 3 inches of the stake should stick out above the roll. Stakes shall be spaced 3 to 4 feet apart.
- B. Silt Fencing:  
Silt fence shall be erected in a continuous fashion from a single roll of fabric. The bottom of the fabric fence shall be buried sufficiently below the ground surface to prevent gaps from forming, usually 4 to 6 inches below ground surface. The fabric shall be installed on the upstream side of the stakes. Stakes shall be strong enough and tall enough to securely anchor the fabric to the ground. Stake spacing shall be no more than 10 feet apart for extra-strength fabric and 6 feet apart for standard strength fabric. Maintenance of the fence is required during construction. Material shall be based on the synthetic fabric requirements as follows:
1. Filtering efficiency: 75% (minimum)
  2. Tensile strength: Standard strength: 30lb/linear inch (minimum), Extra strength: 50 lb/linear inch (minimum)
  3. Elongation: 20% (maximum)
  4. Ultraviolet radiation: 90% (minimum)
  5. Slurry flow rate: 0.3 gal/ft<sup>2</sup>/min (minimum)
- C. Temporary Erosion Checks:
1. Temporary erosion checks shall be constructed in ditches and at other locations designated by the Engineer. The Engineer may modify the Contractor's arrangement of silt fences, bales and bags to fit local conditions.
  2. Fiber rolls, baled straw, silt fences, or some combination, may be used in other areas, as necessary, to inhibit soil erosion.
  3. Siltation fence shall be located and installed as shown on plans or as required to comply with all Federal, State and Local Regulations.
  4. Sedimentation ponds shall be sited and constructed to the grades and dimensions as shown on the Drawings and will include drainage pipe and an emergency spillway.
- D. Erosion control matting for slopes and ditches shall be installed where indicated on the Drawings and as required to stabilize the soil until permanent vegetative stabilization is established.
- E. Maintenance:  
Erosion control features shall be installed prior to excavation wherever appropriate. Temporary erosion control features shall remain in place and shall be maintained until a satisfactory growth of grass is established. The Contractor shall be responsible for maintaining erosion control features throughout the life of the construction contract. Maintenance will include periodic inspections by the Owner or Engineer for effectiveness of location, installation and condition with corrective action taken by the Contractor, as appropriate.
- F. Removing and Disposing of Materials:
1. When no longer needed, material and devices for temporary erosion control shall be removed and disposed of upon approval by Engineer.

2. When removed, such devices may be reused in other locations, provided they are in good condition and suitable to perform the erosion control for which they are intended.
3. When dispersed over adjacent areas, the material shall be scattered to the extent that it causes no unsightly conditions nor creates future maintenance problems.
4. Sedimentation basins, if no longer required, will be filled in, the pipe removed, the surface loamed and grass cover shall be established.

END OF SECTION

SECTION 02401DEWATERINGPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Furnish, operate and maintain, as incidental to the project, dewatering equipment to lower and control ground water table levels and hydrostatic pressures to permit excavation, backfill, and construction to be performed in the dry; collect and dispose of ground and surface water where necessary to complete the work. .

1.2 SUBMITTALS

- A. Provide submittals in accordance with Specification Section 01340.
- B. Submit design calculations, description and complete layout drawings of the proposed dewatering system, stamped and sealed by a Professional Engineer registered in the State of Massachusetts. Such review shall not relieve the Contractor of sole responsibility for the dewatering system as necessary to prevent damage and settlement to adjacent structures, utilities, streets adjacent to excavations and for the safety of persons working within the excavated areas.
- C. Submittal shall include: location, depth and size of wellpoints, headers, sumps, ditches; size and location of discharge lines; capacities of pumps and standby units, and detailed description of dewatering methods to be employed to convey the water from site to adequate disposal.
- D. Submit letter from dewatering system design engineer that the design of the dewatering system has been fully coordinated with the design of the excavation support system.

1.3 DESIGN

- A. Dewatering system shall be designed by a Professional Engineer registered in the State of [PROJECT LOCATION] who is experienced in the design of Dewatering systems
- B. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation at least one foot below the lowest foundation subgrade or bottom of pipe trench to allow material to be excavated in a dry condition. Materials to be removed shall be sufficiently dry to permit excavation to grades shown and to stabilize excavation slopes where sheeting is not required. Operate dewatering system continuously until backfill work has been completed.
- C. Control of surface and subsurface water is part of dewatering system requirements. Maintain adequate control so that:
  1. The stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.
  2. Erosion is controlled.
  3. Flooding of excavations or damage to structures does not occur.

4. Surface water drains away from excavations.
  5. Excavations are protected from becoming wet from surface water, or insure excavations are dry before additional work is undertaken
  6. Prevent loss of fines, seepage, boils, quick conditions or softening of foundation strata.
  7. Maintain stability of sides and bottom of excavation. Construction operations are performed in the dry.
  8. Any existing dewatering wells that can affect dewatering and excavation shall be sealed below the excavation subgrade.
- D. Design shall include an assessment of how the dewatering operations will affect the stability of all adjacent structures
- E. Contractor is responsible to perform whatever additional geotechnical investigations are needed to design the dewatering system to allow for proper construction of new facilities while protecting adjacent structures from damage due to settlement, and in accordance with this specification.

## PART 2 - PRODUCTS

Not Applicable

## PART 3 - EXECUTION

### 3.1 PERFORMANCE

- A. General:
1. Prior to any excavation below the ground water table, place system into operation to lower water table as required and operate it continuously 24 hours a day, 7 days a week until utilities and structures have been satisfactorily constructed, which includes the placement of backfill materials and dewatering is no longer required.
  2. Keep work areas dewatered until the structures, pipes, and appurtenances to be built there have been completed to such an extent that they will not be damaged by water.
  3. Thoroughly brace or otherwise protect against flotation all pipelines and structures which are not stable.
  4. Maintain standby backup equipment and power supply throughout the duration of the dewatering operation.
  5. Prevent soil particles from entering the discharge points.
  6. Ground water level shall be maintained at least one foot below the bottom of the excavation.
- B. Disposal of Water:
1. Dispose of water pumped or drained from the construction site in a suitable manner to avoid siltation of adjacent drainage structures and piping, wetlands or water bodies, injury to public health, damage to public and private property, and damage to the work completed or in progress.
  2. Provide suitable temporary channels for water that may flow along or across the construction site.

3. Provide treatment as necessary to prevent discharge of contaminated ground water caused by Contractor's operations, or any contaminated ground water that may pass through the excavation support system selected by the Contractor.
  4. Contractor must obtain all necessary regulatory approvals for the disposal of dewatering flows. These may include, among others, approval by the USEPA under the National Pollutant Discharge Elimination System (NPDES) program for construction activities.
- C. Damage:
1. Avoid damage to and settlement of adjacent buildings, roads, structures, utilities and other facilities.
  2. Any damage to or settlement of structures resulting from the dewatering operations, or the failure of the Contractor to maintain the work in a suitably dry condition shall be repaired by the Contractor at no additional cost to the Owner.
- D. Temporary Underdrains:
1. When necessary, temporary underdrains may be placed in excavations.
  2. Underdrain pipe shall be perforated corrugated metal, polyethylene or P.V.C. pipe.
  3. Entirely surround the underdrain and fill the space between the underdrain and the pipe or structure with free draining material.
- E. Excavation Sump Pumping:
1. When necessary and where appropriate to the geotechnical conditions encountered, excavations may be over excavated 6 to 12 inches and filled with screened stone to allow sump pumping of groundwater.
  2. The system shall be installed with suitable screens and filters so that pumping of fines does not occur.
- F. Well and Wellpoint System:
1. If necessary, dewater the excavations and trenches with an efficient well or wellpoint system to drain the soil and prevent saturated soil from flowing into the excavated wells and area.
  2. Wellpoint and well system shall be of the type designed for dewatering work and shall be installed with suitable screens and filters so that pumping of fines does not occur.
  3. Pumping units shall be capable of maintaining sufficient suction to handle large volumes of air and water at the same time.
- G. Corrective Action:
1. If dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system (loosening of the foundation strata, or instability of slopes, or damage to foundations or structures), perform work necessary for reinstatement of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Owner.

END OF SECTION

SECTION 02431CATCH BASINS, GRATES AND FRAMESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Construct catch basins, grates, frames and brick masonry in conformance with the dimensions and locations shown on the Drawings.
- B. Related Work Specified Elsewhere: (Where applicable)
  - 1. Pipe, trench excavation and backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

- A. Precast Catch Basin Base, Barrel and Top Sections:
  - 1. Conform to ASTM C478-97 except as modified herein, on the Drawings, or as directed by the Engineer.
  - 2. Average strength of 4,000 psi at 28 days
  - 3. Testing:
    - a. Determine concrete strength by tests on 6 inch by 12 inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
    - b. Have tests conducted at manufacturer's plant or at an approved testing laboratory.
    - c. Have not less than 2 tests made for each 100 vertical feet of precast catch basin sections.
- B. Frames and Covers:
  - 1. Acceptable Manufacturers:
    - a. Etheridge Foundry Company
    - b. Neenah Foundry Company
    - c. E. L. LeBaron Foundry Company
    - d. Or equivalent.
- C. Masonry:
  - 1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
  - 2. Cement: ASTM C-150.
  - 3. Hydrated Lime: ASTM C-207.
  - 4. Sand: ASTM C144.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit shop Drawings and manufacturer's literature in conformance with the Standard General Conditions of the Construction Contract.
- B. Bases, Barrel Sections and Tops: Submit test results and receive approval from the Engineer prior to delivery to the site.

## PART 2 - PRODUCTS

### 2.1 PRECAST CATCH BASIN SECTIONS

- A. Dimensions, as shown on the Drawings.
- B. Use flat tops or eccentric cones as appropriate. Exterior face of cone sections shall not flare out beyond the vertical.
- C. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
- D. Constructed to support an HS-20 wheel loading.
- E. Openings:
  - 1. Provide openings in the risers to receive pipes entering the catch basin of the types and materials approved by the Engineer.
  - 2. Make openings at the manufacturing plant or cut openings in the field.
  - 3. Size: To provide a uniform annular space between the outside wall of pipe and the riser.
  - 4. Location: To permit setting of the entering pipes at the correct elevations.
- F. Joints:
  - 1. Joint gaskets to be flexible self seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
  - 2. Acceptable Materials:
    - a. Kent-Seal No. 2
    - b. Ram-Nek
    - c. Or equivalent.
  - 3. Joints between precast sections shall conform to related standards and manufacturer's instructions.

### 2.2 FRAMES AND GRATES

- A. All essential details of design shall conform to the Drawings. Standard castings differing in non-essential details may be approved by the Engineer.
- B. All frames and grates shall be made of cast iron and shall have machined bearing surfaces to prevent rocking under traffic.
- C. Grate castings will be smooth with no sharp edges.
- D. Constructed to support an HS-20 wheel loading.

### 2.3 MASONRY

- A. Brick:
  - 1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
  - 2. Immediately remove rejected brick from the work.
- B. Mortar:
  - 1. Composition (by volume):
    - a. 1 part portland cement.
    - b. 1/2 part hydrated lime.
    - c. 4-1/2 parts sand.

2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
- C. Cement:
1. Shall be Type II portland cement.
- D. Hydrated Lime:
1. Shall be Type S.
- E. Sand:
1. Shall consist of inert natural sand.
  2. Grading:

<u>Sieve</u>	<u>Percent Passing</u>
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0-5

### PART 3 - EXECUTION

#### 3.1 PERFORMANCE

- A. Precast Catch Basin Sections:
1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
  2. Install barrels and tops level and plumb.
  3. Make all joints water tight.
  4. Solidly fill annular spaces around pipes entering the catch basin with non-shrink grout or other material approved by the Engineer.
  5. Cut openings (as required) carefully to prevent damage to barrel sections and tops. Damaged barrel sections and tops shall be replaced by the Contractor at no additional expense to the Owner.
- B. Pipe Connections to Catch Basins: Connect pipes to catch basins with joint design and materials approved by the Engineer.
- C. Masonry:
1. Laying Brick:
    - a. Use only clean bricks in brickwork for catch basins.
    - b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar or so wet as to be slippery when laid.
    - c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
    - d. Construct all joints in a neat workmanlike manner, construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.



2. Curing:
  - a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
  - b. Protect brick masonry from the weather and frost as required.
- D. Frames and Grates:
  1. Set all frames in a full bed of mortar, true to grade and concentric with the catch basin opening.
  2. Completely fill all voids beneath the bottom flange to make a watertight fit.
  3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the catch basin all around its circumference.
  4. Clean the frame seats before setting the covers in place.
- E. Bedding and Backfilling:
  1. Bedding material of catch basin shall be 6 inches of screened stone (see Section 02200).
  2. Backfill 18 inches all around catch basin with gravel borrow.

END OF SECTION

SECTION 02435CULVERTS AND STORM DRAINSPART 1 - GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Provide and install culvert or storm drain pipe and sections of the type(s), size(s) and in the location(s) shown on the Drawings and as specified herein.

## B. Related Work Specified Elsewhere:

1. Excavation and backfill, dewatering, catch basins, pavement, borrow and bedding material are specified in the appropriate sections in this division.

1.2 SUBMITTALS

A. Submit, in duplicate, sworn certificates of inspections and tests performed at the location of manufacturers.

B. Submit shop drawings in accordance with the General Conditions of the Construction Contract.

1.3 DELIVERY, STORAGE AND HANDLING

A. Exercise care when handling pipe to prevent damage of any nature to pipe and finish.

B. Immediately remove damaged materials and replace at no additional cost to the Owner.

C. Store materials above ground on platforms, skids or other adequate supports.

1.4 FIELD QUALITY CONTROL

A. Acceptance will be on the basis of tests of materials and inspection of the complete product.

B. Inspection may be made at the place of manufacture or on the construction site after delivery, or both, and the pipe shall be subject to rejection at any time due to failure to meet all of the specification requirements, even though sample pipe units may have been accepted as satisfactory at the place of manufacture.

C. Immediately remove from the project site all rejected pipe.

PART 2 - PRODUCTS2.1 MATERIALS

A. Pipe shall be one of the following as specified on the Drawings or at the option of the Contractor and with the approval of the Engineer.

1. Corrugated Aluminum Alloy Pipe
2. Aluminum Coated (Type 2) Corrugated Steel Pipe
3. Zinc-Coated (Galvanized) Corrugated Steel Pipe
4. Steel Structural Plate Pipe
5. Aluminum Alloy Structural Plate Pipe
6. Polymer Precoated, Galvanized Corrugated Steel Pipe

7. Polyvinyl Chloride (PVC) Pipe
  8. Corrugated Polyethylene (PE) Pipe
  9. Reinforced Concrete Pipe
- B. Materials for pipes shall conform to AASHTO Standards.
1. Corrugated Aluminum Alloy Pipe. This pipe and special fittings such as elbows, tees and wyes shall conform to the requirements of AASHTO M196, Type I or II. Special sections, such as elbows and metal end sections, shall be of the gage called for on the plans and shall conform to the applicable requirements of AASHTO M196. Steel sheet shall conform to the requirements of AASHTO M197.
  2. Aluminum Coated (Type 2) Corrugated Steel Pipe. This pipe shall conform to the requirements of AASHTO M36 using steel sheet conforming to AASHTO M274.
  3. Zinc - Coated (Galvanized) Corrugated Steel Pipe. This pipe shall conform to the requirements of AASHTO M36 using steel sheet conforming to AASHTO M218.
  4. Steel Structural Plate Pipe. Plates, bolts, nuts and other accessories shall conform to the requirements of AASHTO specification M167 and the following additional requirements:
    - a. All shop welding shall meet the requirements of the latest edition of AWS D1.1, Structural Welding Code - Steel.
    - b. Annually the fabricator shall have quality control tests performed on uncoated random samples of the lightest and heaviest gage plates produced by welding. The sampling and testing shall be done by a recognized independent testing agency and copies of the test reports, including all welding parameters, shall be submitted to the Engineer as requested.
    - c. No field welding will be allowed.
  5. Aluminum Alloy Structural Plate Pipe. Plates, bolts and nuts for this pipe shall conform to the requirements of AASHTO M219.
  6. Polymer Precoated, Galvanized Corrugated Steel Pipe. This pipe and special fittings such as elbows, tees and wyes shall conform to the requirements of AASHTO M245, Type I, with Type B coating for the pipe as specified in AASHTO M246 with the thinner coating on the outside.
  7. PVC (Polyvinylchloride) Pipe. This pipe and fittings shall conform to the requirements of AASHTO M278. All pipe shall be supplied with gasket type joints meeting the requirements of ASTM D3212.
  8. Corrugated polyethylene pipe. This pipe and fittings shall conform to the requirements of AASHTO M252 and AASHTO M294. The pipe joint system shall be watertight (WT) and shall meet or exceed the current ASTM D3212 Lab Test Requirements and the current ASTM F1417 Watertight Field Test Requirements.
  9. Reinforced Concrete Pipe. This pipe shall conform to the requirements of AASHTO M170, (ASTM C76) except paragraph 6.2. Elliptical pipe shall conform to the requirement of AASHTO M207, except paragraph 6.2. Unless otherwise specified, pipe wall design and use of elliptical reinforcement in

circular pipe are optional. Pipe arch shall conform to the requirements of AASHTO M206, except paragraph 6.2.

Aggregates shall meet the requirements of MDOT Standard Specifications Subsections 703.01 and 703.02 for fine aggregates and coarse aggregates respectively, except that grading requirements are hereby waived.

Precast reinforced concrete special sections shall conform to the requirements of the cited specifications to the extent to which they apply.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. Examine areas to receive piping for the following:
  - 1. Obstructions that adversely affect the installation and quality of the work.
  - 2. Deviations beyond allowable tolerances for clearances.
- B. Examine pipe and fittings before installation to assure no defective materials are incorporated.
- C. Start the work only when conditions are satisfactory.
- D. Remove and replace all defective materials at no additional cost to the Owner.

#### 3.2 INSTALLATION

- A. Do not install pipe, nor backfill, between December 15 and April 1 without the written permission of the Engineer.
- B. Begin laying the pipe at the downstream end.
- C. Place metal pipe with the longitudinal laps of seams at the sides and the outside laps of circumferential joints pointing up grade.
- D. Lay paved or partially lined pipe with the lining on the bottom.
- E. Join flexible pipe sections and metal end sections by coupling bands.
- F. Assemble the plates for structural plate arches according to the manufacturer's assembly instructions and as shown on the Drawings.

END OF SECTION

SECTION 02485LOAMING & SEEDINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, place, and test topsoil, seed, lime, and fertilizer where shown on the drawings and protect and maintain seeded areas disturbed by construction work, as directed by the Engineer.
- B. Related Work Specified Elsewhere (When Applicable): Earthwork, excavation, backfill, compaction, site grading and temporary erosion control are specified in the appropriate Sections of this Division.

1.2 SUBMITTALS AND TESTING

- A. Seed:
  - 1. Furnish the Engineer with duplicate signed copies of a statement from the vendor, certifying that each container of seed delivered to the project site is fully labeled in accordance with the Federal Seed Act and is at least equal to the specification requirements.
  - 2. This certification shall appear in, or with, all copies of invoices for the seed.
  - 3. The certification shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates and certificates have been approved.
  - 4. Each lot of seed shall be subject to sampling and testing, at the discretion of the Engineer, in accordance with the latest rules and regulations under the Federal Seed Act.
- B. Topsoil:
  - 1. Inform the Engineer, within 30 days after the award of the Contract, of the sources from which the topsoil is to be furnished.
  - 2. Obtain representative soil samples, taken from several locations in the area under consideration for topsoil removal, to the full stripping depth.
  - 3. Have soil samples tested by an independent soils testing laboratory, approved by the Engineer, at the Contractor's expense.
  - 4. Have soil samples tested for physical properties and pH (or lime requirement), for organic matter, available phosphoric acid, and available potash, in accordance with standard practices of soil testing.
  - 5. Approval, by the Engineer, to use topsoil for the work will be dependent upon the results of the soils tests.
- C. Lime & Fertilizer:
  - 1. Furnish the Engineer with duplicate copies of invoices for all lime and fertilizer used on the project showing the total minimum carbonates and minimum percentages of the material furnished that pass the 90 and 20 mesh sieves and the grade furnished.

2. Each lot of lime and fertilizer shall be subject to sampling and testing at the discretion of the Engineer.
3. Sampling and testing shall be in accordance with the official methods of the Association of Official Agricultural Chemists.
4. Upon completion of the project, a final check may be made comparing the total quantities of fertilizer and lime used to the total area seeded. If the minimum rates of application have not been met, the Engineer may require the Contractor to distribute additional quantities of these materials to meet the minimum rates.

### 1.3 DELIVERY, STORAGE & HANDLING

#### A. Seed:

1. Furnish all seed in sealed standard containers, unless exception is granted in writing by the Engineer.
2. Containers shall be labeled in accordance with the United States Department of Agriculture's rules and regulations under the Federal Seed Act in effect at the time of purchase.

#### B. Fertilizer:

1. Furnish all fertilizer in unopened original containers.
2. Containers shall be labeled with the manufacturer's statement of analysis.

### 1.4 JOB CONDITIONS

A. Topsoil: Do not place or spread topsoil when the subgrade is frozen, excessively wet or dry, or in any condition otherwise detrimental, in the opinion of the Engineer, to the proposed planting or to proper grading.

#### B. Seeding:

1. Planting Seasons: The recommended seeding time is from April 1 to September 15. The Contractor may seed at other times. Regardless of the time of seeding, the Contractor shall be responsible for each seeded area until it is accepted.
2. Weather Conditions:
  - a. Do not perform seeding work when weather conditions are such that beneficial results are not likely to be obtained, such as drought, excessive moisture, or high winds.
  - b. Stop the seeding work when, in the opinion of the Engineer, weather conditions are not favorable.
  - c. Resume the work only when, in the opinion of the Engineer, conditions become favorable, or when approved alternate or corrective measures and procedures are placed into effect.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### A. Seed:

1. Provide the grass seed mixture approved by the Engineer, having the following composition:
  - a. Park Mixture:

- 50 percent Creeping Red Fescue
- 30 percent Kentucky Bluegrass
- 20 percent Annual Ryegrass
- b. Roadside Mixture:
  - 50 percent Creeping Red Fescue
  - 15 percent Kentucky Bluegrass
  - 5 percent White Clover
  - 2 percent Red Top
  - 3 percent Birdsfoot Trefoil
  - 25 percent Annual Ryegrass
- 2. Do not use seed which has become wet, moldy, or otherwise damaged in transit or during storage.
- B. Topsoil:
  - 1. Fertile, friable, natural topsoil typical of the locality, without admixture of subsoil, refuse or other foreign materials and obtained from a well-drained site. Mixture of sand, silt, and clay particles in equal proportions.
  - 2. Free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, weeds, sticks, brush or other deleterious matter.
  - 3. Not less than 4 percent nor more than 20 percent organic matter.
  - 4. Topsoil depth shall be 4-inches, unless otherwise indicated.
- C. Lime:
  - 1. Provide lime which is ground limestone containing not less than 85% of total carbonate and of such fineness that 90% will pass a No. 20 sieve and 50% will pass a No. 100 sieve.
  - 2. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing a No. 100 sieve. No additional payment will be made to the Contractor for the increased quantity.
- D. Fertilizer:
  - 1. Provide a commercial fertilizer approved by the Engineer.
  - 2. Provide fertilizer containing the following minimum percentage of nutrients by weight:
    - 10% Available phosphoric acid
    - 10% Available potash
    - 10% Available nitrogen (75% of the nitrogen shall be organic)

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Equipment:
  - 1. Provide all equipment necessary for the proper preparation of the ground surface and for the handling and placing of all required materials.
  - 2. Demonstrate to the Engineer that the equipment will apply materials at the specified rates.
- B. Soil: Perform the following work prior to the application of lime, fertilizer or seed.

1. Scarify the subgrade to a depth of 2 inches to allow the bonding of the topsoil with the subsoil.
2. Apply topsoil to a depth of 4 inches or as directed on areas to be seeded.
3. Trim and rake the topsoil to true grades free from unsightly variations, humps, ridges or depressions.
4. Remove all objectionable material and form a finely pulverized seed bed.

### 3.2 PERFORMANCE

#### A. Grading:

1. Grade the areas to be seeded as shown on the Drawings or as directed by the Engineer.
2. Leave all surfaces in even and properly compacted condition.
3. Maintain grades on the areas to be seeded in true and even conditions, including any necessary repairs to previously graded areas.

#### B. Placing Topsoil:

1. Uniformly distribute and evenly spread topsoil on the designated areas.
2. Spread the topsoil in such a manner that planting work can be performed with little additional soil preparation or tillage.
3. Correct any irregularities in the surface resulting from top soiling or other operations to prevent the formation of depressions where water may stand.
4. Thoroughly till the topsoil to a depth of at least 3 inches by plowing, harrowing, or other approved method until the condition of the soil is acceptable to the Engineer. The surface shall be cleared of all debris and or stones one inch or more in diameter.

#### C. Placing Fertilizer:

1. Distribute fertilizer uniformly at a rate determined by the soils test over the areas to be seeded.
2. Incorporate fertilizer into the soil to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.
3. The incorporation of fertilizer may be a part of the tillage operation specified above.
4. Distribution by means of an approved seed drill equipped to sow seed and distribute fertilizer at the same time will be acceptable.

#### D. Placing Lime:

1. Uniformly distribute lime immediately following or simultaneously with the incorporation of fertilizer.
2. Distribute lime at a rate determined from the pH test, to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.

#### E. Seeding:

1. Fine rake and level out any undulations or irregularities in the surface resulting from tillage, fertilizing, liming or other operations before starting seeding operations.
2. Hydroseeding:
  - a. Hydroseeding may be performed where approved and with equipment approved by the Engineer.



- b. Sow the seed over designated areas at a minimum rate of 5 pounds per 1000 square feet.
  - c. Seed and fertilizing materials shall be kept thoroughly agitated in order to maintain a uniform suspension within the tank of the hydroseeder.
  - d. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates.
3. Drill Seeding:
    - a. Drill seeding may be performed with approved equipment having drills not more than 2 inches apart.
    - b. Sow the seed uniformly over the designated areas to a depth of 1/2 inch and at a rate of 5 pounds per 1,000 square feet.
  4. Broadcast Seeding:
    - a. Broadcast seeding may be performed by equipment approved by the Engineer.
    - b. Sow the seed uniformly over the designated areas at a rate of 5 pounds per 1,000 square feet.
    - c. Sow half the seed with the equipment moving in one direction and the remainder of the seed with the equipment moving at right angles to the first sowing.
    - d. Cover the seed to an average depth of 1/2 inch by means of a brush harrow, spike-tooth harrow, chain harrow, cultipacker, or other approved devices.
    - e. Do not perform broadcast seeding work during windy weather.
- F. Compacting:
1. Seeded areas must be raked lightly after sowing unless seeding is to be directly followed by application of an approved mulch.
  2. Compact the entire area immediately after the seeding operations have been completed.
  3. Compact by means of a cultipacker, roller, or other equipment approved by the Engineer weighing 60 to 90 pounds per linear foot of roller.
  4. If the soil is of such type that a smooth or corrugated roller cannot be operated satisfactorily, use a pneumatic roller (not wobbly wheel) that has tires of sufficient size to obtain complete coverage of the soil.
  5. When using a cultipacker or similar equipment, perform the final rolling at right angles to the prevailing slopes to prevent water erosion, or at right angles to the prevailing wind to prevent dust.

### 3.3 PROTECTION & MAINTENANCE

- A. Protection:
1. Protect the seeded area against traffic or other use.
  2. Erect barricades and place warning signs as needed.
- B. Maintenance:
1. At the time of the first cutting, set mower blades two inches high. All lawns shall receive at least two mowings before acceptance. Coordinate schedule for mowing with Engineer.

2. Maintenance shall also include all temporary protection fences, barriers and signs and all other work incidental to proper maintenance.
3. Maintain grass areas until a full stand of grass is indicated, which will be a minimum of 45 days after all seeding work is completed, and shall not necessarily related to Substantial Completion of the General Contract.
4. Protection and maintenance of grass areas shall consist of watering, weeding, cutting, repair of any erosion and reseeded as necessary to establish a uniform stand for the specified grasses, and shall continue until Acceptance by the Engineer of the work of this section. It shall also include the furnishing and applying of such pesticides as are necessary to keep grass areas free of insects and disease. All pesticides shall be approved by Engineer prior to use.

3.4 ACCEPTANCE

- A. At final acceptance of the project all areas shall have a close stand of grass with no weeds present and no bare spots greater than three inches (3") in diameter over greater than five percent (5%) of the overall seeded area.

END OF SECTION

SECTION 02513BITUMINOUS CONCRETE PAVINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
1. Furnish all plant, labor, equipment and materials required to install bituminous concrete pavement courses, including sidewalks, driveways, temporary and permanent trench paving and restoration of pavement markings as shown on the Drawings and as specified herein.
  2. Remove bituminous asphaltic and/or Portland cement pavement, and replace bituminous asphaltic pavement, base, binder courses and surface courses, including temporary pavement, within the area(s) shown on the Drawings and as directed by the Engineer.
  3. Keep pavement removal to a minimum width suitable for the required construction.
  4. Apply pavement markings to the permanent paving as specified.
- B. Work Not Included: Removal and replacement of paving for the convenience of the Contractor will not be considered for payment.
- C. Related Work Specified Elsewhere (When Applicable):
1. Excavation, backfill, aggregate base and subbase.

1.2 QUALITY ASSURANCE

- A. Materials: Use only materials furnished by a bulk bituminous concrete producer regularly engaged in the production of hot mixed, hot laid bituminous concrete.
- B. Equipment: Provide, maintain and operate pavers, dump trucks, tandem, 3-wheel and pneumatic tired rollers well suited to the mixtures being placed. Provide, maintain and operate hand equipment as required. When applicable, provide, maintain and operate trimming equipment and materials.
- C. Mix Requirements, Method of Placement and Compaction: The Commonwealth of Massachusetts, Department of Transportation Standard Specifications - Highways and Bridges, 1973 hereinafter called Massachusetts D.O.T. Standards, for mixing, placing and compacting bituminous concrete surfaces are applicable to this work.

1.3 SUBMITTALS

- A. A certificate of compliance shall be furnished to the Engineer that the materials supplied comply with the specification requirements.
- B. Delivery slips shall be furnished with each load of mix delivered to the project. Information shall include:
1. Vehicle identification.
  2. Date.
  3. Project.
  5. Identification of material.
  6. Gross, tare and net weights.
  7. Signed by the bituminous concrete producer.

8. Stamped by a licensed public weighmaster.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Class 1 Bituminous Concrete.

1. General - These mixtures shall be composed of mineral aggregate, mineral filler, if required, and bituminous material.
2. Composition of the mixture - The mineral aggregates, filler, if required, and bituminous material shall be proportioned and mixed as hereinafter specified to conform with the composition by weight tabulated in Table A, herein. Sufficient approved mineral filler shall be used to correct any deficiencies in grading of fine aggregate.
3. Job Mix Formula - The composition limits in Table A are master ranges of tolerances of materials in general. In order to obtain standard texture, density and stability, the Contractor will furnish to the Engineer a specific job mix formula for the particular uniform combination of materials and sources of supply to be used on each project. The job mix formula for each mixture shall establish a single percentage of aggregate passing each required sieve size, a single percentage of bituminous material to be added to the the aggregate and the number of seconds for dry mixing time and the number of seconds for wet mixing time. AASHO-T195 (Ross Count) with a coating factor of 98% will be used when necessary to evaluate proper mixing time. The job mix formula shall also specify a single source of uniform blend of particular sources for fine aggregate, a single source of supply for mineral filler and for asphalt. Two or more job mix formula may be approved for a particular plant; however, only material conforming to one job mix formula will be permitted to be used on any given calendar day. The job mix formula shall bind the Contractor to furnish paving mixtures not only within the master ranges, but also conforming to the exact formula thus set up for the project, within allowable tolerances as follows:

Asphalt	±0.4%
No. 4 and larger sieves	±7.0%
No. 8 and smaller sieves*	±4.0%
*Except passing No. 200 sieve	±2.0%

4. Asphalt cement shall be:  
AC-5  
AC-10  
AC-20  
AC-40

TABLE A  
\*PERCENT BY WEIGHT  
PASSING  
SQUARE OPENING SIEVES

Standard Sieves	Base Course	Binder Course	Surface Course	**Dense Mix	Surface Treatment	***Patching Mix
2"	100					
1½"	90-100					
1"	65-90	100				
¾"	55-80	80-100				
½"	40-65	55-80	100	100		100
3/8"		80-100	80-100	100	90-100	
No. 4	20-45	28-50	50-76	55-80	80-100	50-65
8	15-33	20-38	37-54	48-63	64-85	24-36
16			26-40	36-49	46-68	14-28
30	8-17	8-22	17-31	24-38	26-50	8-25
50	4-12	5-15	10-23	14-27	13-31	5-21
100			6-16	6-18	7-17	3-15
200	0-4	0-5	2-7	4-8	3-8	2-8
Bitumen	4-5	4.5-5.5	5.5-7.0	7-8	7-8	4-6

- \* Percentages shown in table above for aggregate sizes are stated as proportional percentages of integral total aggregate for the mix.  
 \*\* Dense mix including approved anti-stripping compound shall be furnished and used for protective (bottom) courses of pavement on bridges, and elsewhere shown on the plans.  
 \*\*\* Patching mix shall include 1% of hydrated lime based on weight of total aggregate.

No job mix formula will be approved which specifies:  
 More than 45% passing No. 8 for Top Course.  
 More than 55% passing No. 8 for Dense Mix.  
 Less than 4% passing No. 200 for Top Course.

Should a change of sources of materials be made, a new job mix formula shall be established by the Contractor before the new material is used. When unsatisfactory results or other conditions make it necessary, the Engineer may establish a new job mix formula.

The aggregate will be accepted in stockpile at the plant site. The bituminous material will be accepted on certification.

If the Contractor elects to furnish bituminous concrete from more than one plant, the job mix formula must be adhered to be all plants.

- B. Mineral Filler:
  - 1. Limestone dust, portland cement, or other inert material complying with ASTM D 242 or AASHTO M 17.
- C. Tack Coat:
  - 1. Emulsified type, Grade RS-1, CRS-1, HFMS-1, CSS-1, 1h
- D. Pavement markings shall conform to AASHTO Designation M248-74 for ready-mixed white and yellow traffic paints.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Grade Control:
  - 1. The Contractor shall establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.
- B. Trench areas shall receive initial paving as the work progresses where trenches are in paved streets. Not more than 300 linear feet of backfill trench shall be left unpaved.
- C. Reset all existing manholes to finished grade as required at no additional cost to the Owner.

#### 3.2 PAVEMENT REMOVAL

- A. General:
  - 1. Exercise extreme care in the removal of pavement so that pavement will not be unnecessarily disturbed or destroyed.
  - 2. Mechanically cut pavement to be removed to a straight line, unless otherwise directed by the Engineer.

#### 3.3 SURFACE PREPARATION

- A. Tack coats shall conform to the Mass. D.O.T. Standard Specifications.
- B. Tack Coat:
  - 1. Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gallons per square yard of surface.

#### 3.4 PLACING THE MIX

- A. General:
  - 1. Place asphalt concrete mixture on prepared surface. Minimum allowable temperature for placing is 250°F. Maximum shall be 325°F. Place in areas inaccessible to paving machine and small areas by hand. Place each course to required grade, cross-slope and compacted thickness.

- B. Protection:
  - 1. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened to the extent that the pavement will not be damaged.

3.5 PAVEMENT MARKINGS

- A. Material, approved by the Engineer, is to be furnished and applied after the installation of permanent paving.
- B. Apply pavement markings in accordance with existing markings. Match paint color, marking dimensions, layout and other details with existing markings in the vicinity of the project.

END OF SECTION

SECTION 02610

PIPE & PIPE FITTINGS - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install, support, and test pipe and pipe fittings of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.
- B. Work and materials shall be performed in accordance with the State Plumbing Code when work is within ten (10) feet of buildings.

1.2 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01340 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that pipe and fittings and other piping appurtenances meet or exceed the requirements of these Specifications.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during loading, transporting, unloading, and handling to prevent damage of any nature to interior and exterior surfaces of pipe and fittings.
- B. Do not drop pipe and fittings.
- C. Store materials on the project site in enclosures or under protective coverings in accordance with manufacturer's recommendations and as required by the Engineer.
- D. Assure that materials are kept clean and dry.
- E. Do not store materials directly on the ground.
- F. Follow manufacturer's specific instructions, recommendations and requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials are specified in the following Sections in this Division.
- B. All materials used in the work must be certified "lead free".

PART 3 - EXECUTION

3.1 INSPECTION

- A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
  - 1. Defects and damage.



2. Deviations beyond allowable tolerances for joint dimensions.
3. Removal of debris and foreign matter.
- D. Examine areas and structures to receive piping for:
  1. Defects, such as weak structural components that adversely affect the execution and quality of work.
  2. Deviations beyond allowable tolerances for pipe clearances.
- E. All materials and methods not meeting the requirements of this Contract will be rejected.
- F. Immediately remove all rejected materials from the project site.
- G. Start work only when conditions are corrected to the satisfaction of the Engineer.

### 3.2 INSTALLATION

- A. General:
  1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations and as specified herein.
  2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
  3. Install adapters, acceptable to the Engineer, when connecting pipes constructed from different materials.
- B. Installation in Trenches:
  1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
  2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
  3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
  4. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
  5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.
  6. Set the pipe true to line and grade.
  7. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
  8. Immediately after making a joint, fill the holes for the joints with bedding material, and compact.
  9. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
  10. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
  11. Take all necessary precautions to prevent floatation of the pipe in the trench.
  12. Bedding and backfill for all pipe materials shall be as specified in Section 02200, Earthwork, and as shown on the Drawings.
- C. Temporary Plugs:
  1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.

2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
3. Do not use the pipelines as conductors for trench drainage during construction.

3.3 CLEANING AND TESTING

- A. All cleaning and testing shall be performed as specified in Division 2.

END OF SECTION

SECTION 02615

DUCTILE IRON PIPE & FITTINGS  
(BURIED APPLICATIONS)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provide and install ductile iron pipe and fittings of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere:
  - 1. Pipe and Pipe Fittings - General is specified in the appropriate Section in this Division.
  - 2. Excavation, Bedding and Backfill are specified in this Division.

1.2 QUALITY ASSURANCE

- A. Standards (As Applicable):
    - 1. Cement-mortar lining for water: ANSI A21.4 (AWWA C104).
    - 2. Rubber gasket joints: ANSI A21.11 (AWWA C111).
    - 3. Ductile iron pipe thickness: ANSI A21.50 (AWWA C150).
    - 4. Ductile iron pipe centrifugally cast in metal or sand lined molds: ANSI A21.51 (AWWA C151).
  - B.
    - 5. Pipe flanges and fittings: ANSI B16.1 and ANSI A21.10 (AWWA C110).
    - 5. Threaded, flanged pipe: ANSI A21.15 (AWWA C115).
    - 6. Cast and ductile iron fittings: ANSI A21.10 (AWWA C110).
    - 7. Ductile Iron Compact Fittings: ANSI 21.53 (AWWA C153).
- Acceptable Manufacturers:
- 1. Tyler
  - 2. Griffin
  - 3. Union
  - 4. US Pipe
  - 5. Or equivalent.

1.3 DELIVERY, STORAGE & HANDLING

- A. Exercise extra care when handling ductile iron pipe because it is comparatively brittle.
- B. Exercise extra care when handling cement lined pipe because damage to the lining will render it unfit for use.
- C. Protect the spherical spigot ends and the plain ends of all pipe during shipment by wood lagging securely fastened in place.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

- A. General:
  - 1. All exterior (buried) ductile iron pipe shall have push-on or mechanical joints unless otherwise specified or shown on the Drawings. Pipe within valve pits and other structures is considered interior pipe and shall be flanged.

2. Unless otherwise shown on the Drawings or in the pipe schedule, the minimum thickness of ductile iron pipe shall be:
    - a. For pipe 4 inches in diameter and smaller: Class 51.
    - b. For pipe 6 inches in diameter and larger: Class 52.
    - c. Pipe with flanges: Class 53.
  3. Pipe for use with sleeve type couplings shall have plain ends (without bells or beads) cast or machined at right angles to the axis.
  4. Pipe shall be double thickness cement lined and seal coated unless noted otherwise on the Drawings, and except for air piping lines which shall be completely unlined.
  5. Pipe for use with split type couplings shall have ends with cast or machined shoulders or grooves that meet the requirements of the manufacturer of the couplings.
  6. Factory applied bituminous coatings (in accordance with AWWA C151) shall be furnished on the exterior of all underground piping unless specified otherwise.
  7. The outside of pipe within structures and exposed shall not be coated with bituminous coating, but shall be thoroughly cleaned and given one shop coat of Intertol Rustinhibitive Primer 621 by Koppers Co.; Multiprime by PPG Industries; Chromox 13R50 Primer made by Mobil Chemical Co.; or equivalent.
- B. Joints (as shown on Drawings or as specified):
1. Push-on and Mechanical Joint:
    - a. The plain ends of push-on pipes shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
    - b. Provide gaskets manufactured from a composition material suitable for exposure to the fluid to be contained within the pipe. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40°F to 250°F.
    - c. Bolts and nuts for buried mechanical joints shall meet the AWWA C-111 requirements and be made of high strength, low alloy steel.
  2. Joint Restraint:
    - a. Provide joint restraint to prevent the piping from pulling apart under pressure as required and as shown on the Drawings. Mechanical joint restraints shall be used for valves, fittings, hydrants, etc., and piping sections less than 50 feet in length.
    - b. Types of restraints:
      - (1) Pipe and fittings furnished with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace flange bolts of a smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The clamps, tie rods, and bridles shall be coated with bituminous paint in buried installations and shall be coated with the same coatings as the piping system in interior installations after assembly or, if necessary, prior to assembly.
      - (2) Mechanical joint follower gland pipe restrainers.
        - a. Ductile iron gland and restraining ring.

- b. Gasket shall be standard MJ gasket -ANSI/AWWA-C111/A21.11.
  - c. Working pressure 350 psi, up to 8 inches; 250 psi, 10 inches to 16 inches.
  - d. Test pressure two times working pressure.
  - e. Grip Rings™, Romac Industries, or other equivalent as approved by Engineer.
- (3) Other types of bracing as shown on the Drawings.

## 2.2 FITTINGS

### A. Standard Fittings:

- 1. Pressure rating of 350 psi for D.I. compact fittings and 250 psi for all others unless indicated otherwise on the Drawings or as specified.
- 2. Joints the same as the pipe with which they are used or as shown on the Drawings.
- 3. Cement lining and seal coat as specified for pipe.
- 4. Factory applied bituminous coatings shall be furnished for all underground fittings.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
  - 1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
  - 2. Deviations beyond allowable tolerances for pipe clearances.
- D. Immediately remove all rejected materials from the project site.

### 3.2 INSTALLATION

#### A. General:

- 1. Install in strict accordance with the pipe and fitting manufacturer's instructions and recommendations and as specified or as shown on the Drawings.
- 2. Pipe shall be installed with a minimum of 4'-6" of cover. Where the specified cover cannot be attained, the pipe shall be insulated 8' beyond the section in question.
- 3. Concrete thrust blocks or other acceptable thrust resistant system is required at all fittings on pressure pipe. Where thrust blocks are used, these shall be placed against undisturbed soil or screened gravel compacted to 95 percent and shall be placed so that the joints are accessible for repairs.

#### B. Separation:

- 1. When a water pipe crosses above or below a sewer pipe, the following procedures shall be utilized.
  - a. Horizontal Separation: Whenever possible, water pipe shall be laid at a minimum of at least 10 feet horizontally from any existing or proposed sewer. Should local conditions prevent a lateral separation of 10 feet, a water pipe may be laid closer than 10 feet to a sewer pipe, if:

- i. It is laid in a separate trench, or if
    - ii. It is laid in the same trench with the sewer located at one side on a bench of undistributed earth, and if
    - iii. In either case, the elevation of the top (crown) of the sewer is at least 18 inches below the bottom (invert) of the water main.
  - b. Vertical Separation: Whenever water mains must cross under sewers, the water main shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint pipe for a distance of 10 feet on each side of the sewer. One full length of the water main should be centered over the sewer so that both joints will be as far from the sewer as possible.
    - i. When it is impossible to obtain horizontal and/or vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical-joint cement lined ductile iron pipe or other equivalent based on watertightness and structural soundness. Both pipes shall be pressure tested by an approved method to assure watertightness or both pipes shall be encased in concrete.
2. Assembling Joints:
  1. Push-on Joints:
    - a. Insert the gasket into the groove of the bell.
    - b. Uniformly apply a thin film of special lubricant over the inner surface of the gasket that will contact the spigot end of the pipe.
    - c. Insert the chamfered end of the plain pipe into the gasket and push until it seats against the bottom of the socket.
  2. Bolted Joints:
    - a. Remove rust preventive coatings from machined surfaces prior to assembly.
    - b. Thoroughly clean and carefully smooth all burrs and other defects from pipe ends, sockets, sleeves, housings and gaskets.
    - c. After jointing coat all bolts with bituminous material compatible with the pipe coating required herein and/or in Section 09900.
  3. Flanged Joints:
    - a. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.
    - b. Execute care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.
  4. Mechanical Joints:
    - a. Thoroughly clean, with a wire brush, surfaces that will be in contact with the gaskets.
    - b. Lubricate the gasket, bell, and spigot by washing with soapy water.
    - c. Slip the gland and gasket, in that order, over the spigot and insert the spigot into the bell until properly seated.
    - d. Evenly seat the gasket in the bell at all points, center the spigot, and firmly press the gland against the gasket.

- e. Insert the bolts, install the nuts finger tight, and progressively tighten diametrically opposite nuts uniformly around the joint to the proper tension with a torque wrench.
  - f. The correct range of torque (as indicated by a torque wrench) and the length of wrench (if not a torque wrench) shall not exceed:
    - (1) Range or Torque: 60-90 ft.-lbs.
    - (2) Length of Wrench: 10 inches.
  - g. If effective joint sealing is not attained at the maximum torque specified above, disassemble, thoroughly clean, and reassemble the joint. Do not overstress the bolts to tighten a leaking joint.
5. Bell and Spigot Joints:
- a. Thoroughly clean the bell and spigots and remove excess tar and other obstructions.
  - b. Insert the spigot firmly into place and hold securely until the joint has been properly completed.
3. Fabrication:
- 1. Tapped Connections:
    - a. Make all tapped connections as shown on the Drawings or as required by the Engineer.
    - b. Make all connections watertight and of adequate strength to prevent pullout.
    - c. Drill and tap normal to the longitudinal axis of the pipe.
    - d. Taps in fittings shall be located where indicated by the manufacturer for that particular type of fitting.
    - e. The maximum sizes of taps in pipes and fittings without busses shall not exceed the sizes listed in the appendix of ANS A21.51 based on 2 full threads for ductile iron and 3 full threads for cast iron.
  - 2. Cutting:
    - a. Perform all cutting as set forth in AWWA C600.
    - b. Carefully chamfer all cut ends to be used with push-on joints to prevent damage to gaskets when pipe is installed.
4. Pipe Deflection:
- 1. Push-on and Mechanical Joints:
    - a. The maximum permissible deflection of alignment at joints shall be limited to that given in AWWA C600.
  - 2. Flexible Joints:
    - a. The maximum deflection in any direction shall not exceed the manufacturer's instructions and recommendations.

END OF SECTION

SECTION 02620TEMPORARY WATER MAINPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test all fuse high density polyethylene (HDPE) or PVC temporary water pipe, pipe fittings and services and appurtenances of the type(s) and size(s) and in the location(s) as shown on the Drawings and as herein specified. HDPE is preferred for use on this project.
- B. Related Work Specified Elsewhere:
  - 1. Cleaning and Testing is specified in Section 02675.

1.2 PROJECT CONDITIONS

- A. The work includes the installation of a temporary water main in order to by-pass an existing water distribution system main that is to be removed and replaced. The temporary water main will provide potable water service to the existing customers in the project area.
- B. The water distribution system experiences water pressures of approximately 100 psi in this area of the distribution system.
- C. The Contractor shall coordinate with the Water Department before making the connection of the temporary water main to the existing water distribution system. Temporary water mains shall not be installed or in operation between October 15 and April 15.

1.2 SUBMITTALS

- A. A temporary piping plan detailing all of the requirements specified herein shall be submitted prior to the start of the work for approval.
- B. In certain instances, additional isolation valves may be required to be installed in the existing water main system to properly install, maintain and isolate the temporary water mains. Any needed valves required for the proper installation and operation of the temporary system shall be installed by the Contractor at no additional cost to the Owner.
- C. Submit experience statement for operator(s) conducting the pipe fusion. Installation shall be performed by personnel with a minimum five (5) years experience conducting pipe fusion projects.

1.3 QUALITY ASSURANCE

- A. Provide pipe and fittings manufactured by a single manufacturer.
- B. Pressure rating or pressure class of pipe as detailed herein.
- C. Standards:
  - 1. ASTM D 1248 Polyethylene Plastics Molding and Extrusion Materials.
  - 2. ASTM D 1505 Density of Plastics by the Density Gradient Technique.
  - 3. ASTM D 1693 Environmental Stress Cracking of Ethylene Plastics.



4. ASTM D 1928 Preparation of Compression Molded Polyethylene Test Samples.
  5. ASTM D 1784 - Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (PVC) Compounds.
  6. ASTM D 2241 - PVC Pressure Rated Pipe (SDR Series).
  7. ASTM D 3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
- D. Acceptable Manufacturers:
1. Ryerson & Son, Inc. "Mono-Line"
  3. Dupont, "Aldyl-D"
  4. Sheldon "Sclairpipe"
  5. Certainteed Yelomine PVC
  6. Or approved equal.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Polyethylene Pipe:
1. The pipe shall be obtained by polymerization of no less than 85% ethylene and no less than 95% of total olefins by weight.
  2. The polyethylene resin shall be classified as a Type III, Class C, Category 3. Nominal density shall be 0.941 to 0.959.
  3. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black, well dispersed in a concentration of not less than 2%.
  4. The polyethylene resin compound shall have a resistance to environmental stress cracking as determined by procedure detailed in ASTM D 1693 with sample preparation by procedure C of ASTM D 1928 of not less than 40 hours.
  5. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
  6. Polyethylene fittings shall have the same pressure rating as the pipe.
  7. Adaptors: When applicable, provide adaptors for connecting polyethylene pipe to pipe constructed from other materials. All flanges shall have metal backing rings.
  8. Pipe pressure rating shall be 150 psi (SDR-11) minimum.
- B. Polyvinyl Chloride (PVC) Pipe:
1. PVC pipe shall be made from Type 1, Grade 1, 2000 psi design stress, Class 12454-B formulation Polyvinyl Chloride.
  2. PVC formulation shall contain impact modifiers and ultraviolet inhibitors for use in above-ground temporary applications.
  3. Pipe shall have potable water service certification in accordance with NSF No. 14 (National Sanitation Foundation Standard) for Thermoplastic materials, pipe fittings, valves, traps, and joining materials.
  4. Pipe pressure rating shall be 150 psi (SDR-18) minimum.
- C. Service Corporations: Provide corporation and service saddle for all services as required.

- D. Water Main Valves: Provide gate valves at the connection to the distribution system and every 1,000 feet of installed temporary water main.
- E. Provide Water Department approved backflow preventers at connections to distribution system.
- F. Water Department will provide and Contractor shall install flow meter.
- G. Hydrants: Provide temporary hydrants where indicated on the drawings.

## 2.2 FABRICATION

### A. Polyethylene Pipe:

- 1. Thermal Butt-Fusion:
  - a. Join the pipe to itself, or to the polyethylene fittings or to the flange connections by means of thermal butt-fusion.
  - b. Have all fusion performed by personnel trained by the pipe supplier or other qualified persons, using tools approved by the pipe supplier.
  - c. The polyethylene fittings and flanged connections to be joined by thermal butt-fusion shall be from the same type, grade and class of polyethylene compound as the polyethylene pipe unless otherwise approved.
  - d. Joint strength must be equal to that of the adjacent pipe.
- 2. Mechanical Connections: The mechanical connections of the polyethylene pipe to auxiliary equipment shall be in accordance with the pipe suppliers written instructions. All fitting shall be restrained.

### B. Polyvinyl Chloride (PVC) Pipe:

- 1. Fittings shall be supplied with Teflon coated "O"-ring to minimize assembly and disassembly effort required to install, remove and reinstall the system.
- 2. Mechanical Connections: The mechanical connections of the PVC pipe to auxiliary equipment shall be in accordance with the pipe suppliers written instructions. All fittings shall be restrained.

### C. Services:

- 1. Services shall be polyethylene pipe or NSF certified hose.
- 2. Minimum services size shall be 1-inch. Larger services may be required for non-residential uses. Engineer shall determine minimum service size.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF TEMPORARY MAIN

- A. Temporary water mains shall be placed in a manner that protects the pipeline from traffic, vandalism, etc. Pipeline shall be laid along edge of roadways or in curblines whenever possible.
- B. Water mains shall be protected at all driveway entrances and curb cuts by the use of gravel, temporary pavement, or steel access ramps. In lieu of access ramps, in areas that will have new pavement, a shallow trench may be cut to allow the shallow burial of the temporary main. If trenching is used, trenches shall be sawcut, refilled with compacted gravel and repaved with trench pavement prior to final paving.

- C. Temporary mains for all streets shall consist of a 4" main placed on one side of the street and a minimum 2" main placed on the opposite side. Branches from the 4" main to the 2" main shall consist of 4" pipe.
- D. Temporary hydrants shall be placed at existing hydrant locations or no greater than a 500' spacing.
  - E. Main line valves shall be provided at a maximum spacing of no greater than 500'.
- E. Temporary main shall be maintained in working order until such a time that all of the structures are being served by the new main. If the temporary main fails, the CONTRACTOR shall restore the main within 12 hours. No temporary watermains or temporary water services shall be installed or operated during freezing weather. Temporary pipes already in use shall be removed or drained and existing services restored when so directed by the ENGINEER or OWNER.

### 3.2 INSTALLATION OF SERVICES

- A. The Contractor shall provide written notices to all affected property owners a minimum of 24 hours prior to any disruption of water service as a result of the temporary by-pass.
- B. All services tapped to the temporary main will have a shutoff at the main to allow isolation of the individual service.
- C. Each structure shall have their own temporary service connected to the temporary main.
- D. Residential services may be back-fed through an external hose bib if available. If a hose bib is utilized, Contractor shall shutoff the existing feed to the structure at the meter to prevent back-feeding the old main and shall confirm that the connection properly services the entire structure.
- E. For services where no external hose bib or other connection is available or larger than residential flows are required, the Contractor shall excavate the existing building service and direct connect the service to the temporary main.
- F. For fire protection (sprinkler) services, the Contractor shall coordinate with the Building Owner and Fire Department for service size and sprinkler service connection requirements. Contractor shall not connect sprinkler services without express written permission of the Building Owner.
- G. Temporary services shall be maintained in working order until such a time that all of the structures are being served by the new main. If a temporary service fails, the CONTRACTOR shall restore the main within 12 hours.

### 3.3 HYDRANTS

- A. When a hydrant is removed from service, a temporary hydrant shall be installed and maintained.
- B. Hydrants that are out of service during construction operations shall be bagged and clearly marked with a "HYDRANT OUT OF SERVICE" tag.

3.4 CLEANING AND TESTING

- A. Temporary water main shall be flushed, pressure tested at 150 psi and disinfected per Specification Section 02675 before permanently shutting down the existing main.

END OF SECTION

SECTION 02626COPPER SERVICE PIPE & FITTINGS  
(BURIED APPLICATIONS)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install copper pipe of the type and size and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Seamless copper water tube, ASTM B88.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Pipe:
1. American Manufactured
  2. Domestic Water (buried exterior).
    - a. Type K, soft annealed.
    - b. Minimum 1-inch diameter.
- B. Fittings:
1. Buried Fittings: All potable water fittings shall be lead free in compliance with NSF 61 Annex G and NSF 372.
  2. Acceptable manufacturer: Mueller Co., Decatur, IL. or Equal

PART 3 - EXECUTION3.1 INSTALLATION

- A. Jointing
1. Packed on compression joints
    - a. Cut pipe squarely.
    - b. Ream or file pipe to remove burrs.
    - c. Seat pipe in fittings and tighten nut.
  2. Adapters: Use as required to connect to existing services.
- B. Bending Pipe
1. Bend pipe by the method and to the radius to comply with the manufacturer's recommendations.
  2. Bend pipe with suitable tools to provide smooth bend free of any cracks or buckles.
  3. Provide "goose neck" in new services as shown on Drawings.

END OF SECTION

SECTION 02640VALVES AND SPECIALTIES - GENERALPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, support, and test valves, gates, hydrants, cocks, stops, and other specified materials, when applicable, (hereinafter referred to as "valves") in the location(s) and of the size(s) and quantities shown on the Drawings and/or as specified herein.

1.2 QUALITY ASSURANCE

- A. Provide valves of proven reliability manufactured by reputable manufacturers.  
 B. Acceptable manufacturers are listed in each section of this Division. Substitute or "or-equal" valves will be allowed only when indicated.

1.3 SUBMITTALS

- A. Provide shop drawings and operation and maintenance manuals in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.

1.4 DELIVERY AND HANDLING

- A. Shipping:
1. Prepare valves and accessories for shipment as required for complete protection.
  2. Seal valve ends to prevent entry of foreign matter into valve body.
  3. Box, crate, completely enclose, and protect valves and accessories from accumulations of foreign matter.
- B. Storage:
1. Store valves and accessories in an area on the construction site protected from weather, moisture, or possible damage.
  2. Do not store valves or accessories directly on the ground.
- C. Handling: Handle valves and accessories to prevent damage of any nature to the interior and the exterior surfaces.

1.5 INSPECTION

- A. Carefully inspect all materials for:
1. Defects in workmanship and materials.
  2. Removal of debris and foreign material in valve openings and seats.
  3. Proper functioning of all operating mechanisms.
  4. Tightness of all nuts and bolts.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Materials are specified in appropriate Sections in this Division.

- B. The specifications direct attention to certain required features of the valves and gates but do not purport to cover all details entering into their design and construction. Nevertheless, the Contractor shall furnish the valves and gates complete in all details and ready for operation for the intended purpose.

## 2.2 SURFACE PREPARATION AND SHOP COATINGS

- A. Provide surface preparation and shop coatings in accordance with the applicable section of Division 2.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install valves and accessories in strict accordance with manufacturer's instructions and recommendations, as shown on the Drawings and/or as specified herein.
- B. Carefully erect all valves and support them in their respective positions free from distortion and strain.
- C. Independently support all valves connected to pumps and equipment, and in piping systems that cannot support valves.
- D. Repair any scratches, marks and other types of surface damage etc. with original coating as supplied by the factory.
- E. Install valves such that operators are plumb and vertical.
- F. All valves (and actuators where specified) shall be installed in a manner that will provide for proper clearances and ease of operation. In addition, valve operators must be capable of being rotated in 90° increments to facilitate field installation.
- G. Check and adjust all valves and accessories for smooth operation.

### 3.2 TESTING

- A. The Contractor shall test all valves and gates in the presence of the Engineer to demonstrate that each valve and gate complies with specified requirements and allowable leakage rates.

END OF SECTION

SECTION 02641GATE VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test gate valves of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified.

1.2 QUALITY ASSURANCE

- A. All gate valves of same type and style shall be manufactured by one manufacturer.
- B. Acceptable Manufacturers:
1. Mueller
  2. Or approved equal.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Waterworks type NRS valves (AWWA):
1. Valve Body, bonnet and stuffing box - Cast iron (ASTM A126, C1B), coated inside and out with fusion bonded epoxy meeting AWWA C550. Face-to-face dimensions shall comply with ANSI B16.10 and flanges to comply with ANSI B16.1.
  2. Resilient Wedge - Ductile iron wedge with bonded Nitrile elastomer covering.
  3. Stem - Manganese bronze, ASTM B584
  4. Stuffing box O-rings
    - a. Two O-rings, each nitrile rubber.
    - b. Capable of changing under pressure.
  5. Wedgenut - Bronze, ASTM B62
  6. Bolting - stainless steel Type 18-8, ASTM F593, GP1
  7. End Connections
    - a. Mechanical joints
  8. Operation
    - a. 2 inch square nut, cast iron, ASTM A126, C1B
    - b. Opening Direction – clockwise (right)
  9. Water working pressure: 250 psi
  10. Standards - valves shall meet or exceed AWWA C509, latest edition.

PART 3 - EXECUTION3.1 GENERAL

- A. All valves shall be inspected for defects prior to installation. Defective materials shall be immediately removed from the site.
- B. All foreign matter shall be removed from the valve opening and seat faces.



3.2 INSTALLATION

- A. Install valves with stem position vertical.
- B. All nuts and bolts shall be checked for tightness.
- C. Non-wooden blocking shall be placed under each valve to insure against settlement.
- D. Valve box vertical and centered over operating nut.
- E. Valve box supported during backfilling and maintained vertical.
- F. Install and test in accordance with AWWA C500 and AWWA C-509, latest revision.
- G. For PVC or PE main, install anchor rods around the valve body or through the mounting lugs and embed the rods in concrete beneath the valve.

END OF SECTION

SECTION 02642CORPORATION STOPSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install corporation stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All corporation stops shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a reasonable number of years.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Constructed of "lead-free" brass per the requirements of NSF/ANSI 61 Annex G and NSF/ANSI 372.
- B. Outlet shall be conductive compression connection for CTS O.D. tubing.
- C. Inlet shall have AWWA (CC) standard thread.
- D. Acceptable Manufacturers:
  - 1. Mueller, Model H-15008N
  - 2. Or equivalent

PART 3 - EXECUTION3.1 INSTALLATION

- A. Install at locations shown on the Drawings and as specified in accordance with manufacturer's instructions.
- B. Check and adjust all corporation stops for smooth operation.
- C. 1-inch service taps on a main 6-inches or smaller and 1 1/2" – 2" service taps will require a saddle (double band type). 1-inch connections on mains 8-inches or larger shall be a direct tap.

END OF SECTION

SECTION 02643CURB STOPSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install curb stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All curb stops shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products shall have proven reliable in similar installations over a reasonable number of years.
- C. Acceptable Manufacturers:
  - 1. Mueller (Model H-15219N)
  - 2. Or equivalent

PART 2 - PRODUCTS2.1 PRODUCT CONSTRUCTION

- A. Constructed of "lead-free" brass per the requirements of NSF/ANSI 61 Annex G and NSF/ANSI 372.
- B. Inlet and outlet shall be conductive compression connection for CTS O.D. tubing.
- C. Quarter turn check with drain.
- D. Open right
- E. Working pressure of 175 psi shall be required.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Install at locations shown on the Drawings and in accordance with manufacturer's instructions.

3.2 ADJUSTMENTS

- A. Check and adjust all curb stops for smooth operation.

END OF SECTION

## SECTION 02644

### HYDRANT ASSEMBLIES

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. Work Included: Furnish and install hydrant assemblies of the type(s) and size (s) and in the locations (s) shown on the Drawings and as specified herein.
- B. Hydrant Assemblies consist of:
  - 1. Hydrant tee.
  - 2. 6 inch gate valve and valve box.
  - 3. 6 inch hydrant branch piping.
  - 4. Hydrant.
  - 5. Drainage material.
  - 6. Thrust blocking and joint bracing.

##### 1.2 QUALITY ASSURANCE

- A. Hydrants shall conform to AWWA C502 and all hydrants shall be from one manufacturer.
- B. Gate valves shall conform to AWWA C509 (Resilient-Seated Gate Valves for Water Supply).
- C. The City has standardized on the following hydrant only:
  - 1. American Flow Control B62B

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- A. Fire Hydrants:
  - 1. Dry barrel type with a 5-1/4 inch minimum valve opening.
  - 2. Two (2) 2-1/2 inch hose connections and one (1) 4-1/2 inch pumper connection.
    - a. 2-1/2 inch outlets: 60° V threads, 7-1/2 threads to the inch, external threads 3-1/16 inches, O.D. National Standard threads.
    - b. 4-1/2 inch outlet: 4 threads to the inch, external threads 5-3/4 inches, O.D. National Standard threads.
    - c. Supply adapters if existing fire fighting equipment does not match the threads specified above.
  - 3. 200 pounds working pressure and 300 pounds hydrostatic test pressure.
  - 4. Working parts shall be bronze
  - 5. Direction of open – right (clockwise)
  - 6. Designed with standpipe breaking ring or breakable sections.
  - 7. Caps shall be attached to hydrant body by chains.
  - 8. Hydrant shall include positive automatic drain to prevent freezing.
  - 9. Supply one (1) collision repair kit for every twenty-five (25) hydrants installed.

- B. Gate Valves: Waterworks type non-rising stem AWWA valve as specified in the appropriate section of this Division.
- C. Valve Boxes: As specified in Division 2.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install hydrants as shown in the details and using manufacturer's written instructions.
- B. No hydrant assembly shall be backfilled until approved by the Engineer.
- C. Provide drainage material and thrust blocks as shown.
- D. Provide barrel extensions as required for hydrant to be installed at proper grade.
- E. Hydrants to be ordered and delivered to the site painted in Waltham standard colors prior to installation. Colors are as follows:
  - a. Hydrant top and caps – Black
  - b. Hydrant body - Yellow

#### 3.2 CLEANING

- A. Clean all hydrants of concrete, etc. and repaint as necessary to the satisfaction of the Engineer.

END OF SECTION

SECTION 02645CURB BOXESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install curb boxes of type (s) and size (s) and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All curb boxes shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a reasonable number of years.
- C. Acceptable Manufacturers:
  - 1. A.Y. McDonald
  - 2. Bingham & Taylor
  - 3. Or equivalent.

PART 2 - PRODUCTS2.1 MATERIALS AND FABRICATION

- A. Cast iron, tar coated, telescoping "Buffalo" type, cast iron lid, and threaded bronze plug with pentagon nut (Rope Thread).
- B. 1/2" diameter stainless steel minimum, 30" stationary rod.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Install as shown on the Drawings and/or as requested by the Engineer.
  - 1. When installation is complete no pressure shall be exerted by the curb box on either the curb stop or the service pipe.

END OF SECTION

SECTION 02646VALVE BOXESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install valve boxes of type(s) and size(s) and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All valve boxes shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products to have been proven reliable in similar installations over a reasonable number of years.
- C. Acceptable Manufacturers:
  - 1. East Jordan Iron Works
  - 2. Tyler Union
  - 3. Bingham & Taylor
  - 4. Or Equivalent

PART 2 - PRODUCTS2.1 MATERIALS

- A. The valve box shall be ductile iron, slip type two-piece integral base, 5-1/4 inch shaft. Top section with flanges.
- B. Cast or Ductile iron, with the word "Water" cast in covers.
- C. Belled Base Section.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Installation as shown on the Drawings and/or as specified herein.
  - 1. When installation is complete, no pressure shall be exerted by valve box on the water main or on the valve.
  - 2. Be of such length as required without full extension. Minimum overlap between upper and lower sections shall be 6-inches.

END OF SECTION

SECTION 02648COUPLINGS & CONNECTORS FOR BURIED APPLICATIONSPART 1 - GENERAL1.1 DESCRIPTION

- A. Furnish and install couplings and connectors for water mains of the type and size in the location shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Minimum pressure rating equal to that of the pipeline on which they are to be installed.

PART 2 - PRODUCTS2.1 MATERIALS

- A. All Couplings and Connectors:
  - 1. Gasket Materials: Composition suitable for exposure to the liquids to be contained within the pipes.
  - 2. Diameters to properly fit the specific types of pipes on which couplings and connectors are to be installed.
- B. Sleeve Type Flexible Couplings:
  - 1. Buried Couplings:
    - a. Ductile iron center sleeve and segmented end rings made per ASTM A536, Grade 65-45-12
    - b. Two wedge-section virgin NBR rubber gaskets compounded for water service, in accordance with ASTM D2000.
    - c. Nuts and bolts shall be 304 Stainless Steel with Anti-galling protection.
    - d. Acceptable Manufacturers:
      - (1) Dresser Style 153
      - (2) Smith Blair Style 441
      - (3) Or Equal
- C. Solid Sleeve Couplings:
  - 1. Solid sleeves shall be ductile iron with mechanical joint ends.
  - 2. Couplings shall meet AWWA/ANSI C-153/A21.53 and C-111/A21.11 for joints, and C-104/A21.4 for cement lining in sizes 3"-24".
  - 3. Nuts and bolts shall be ductile iron low alloy steel per ANSI/AWWA A21.11/C-111.



### PART 3 - EXECUTION

#### 3.1 INSTALLATION

##### A. Sleeve Type Couplings:

1. Thoroughly clean pipe ends a minimum of 12-inches from the ends prior to installing couplings, and use soapy water as a gasket lubricant.
2. Slip an end ring and gasket over each pipe and place the center sleeve centered over the joint.
3. Insert the other pipe length into the center sleeve the proper distance.
4. Press the gaskets and end rings evenly and firmly into the center sleeve flares.
5. Insert the bolts, finger tighten and progressively tighten diametrically opposite nuts uniformly around the adapter with a torque wrench applying the torque recommended by the manufacturer.
6. Insert and tighten the tapered threaded lock pins.

##### B. Install thrust rods, supports, and other provisions to properly support pipe weight and axial equipment loads.

END OF SECTION

SECTION 02649SERVICE SADDLESPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included: Furnish and install service saddles of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. All service saddles of the same type shall be manufactured by one manufacturer.

B. Qualifications of Manufacturer: Products shall have proven reliable in similar installations over a reasonable number of years.

PART 2 - PRODUCTS2.1 MATERIALS

A. For cast iron & ductile iron pipe.

1. Body casting - bronze.

2. Double strap required.

6. Acceptable manufacturer.

a. Mueller Co.

c. Or equivalent.

PART 3 - EXECUTION3.1 INSTALLATION

A. Install at locations shown on the Drawings and as specified by the pipe manufacturer and saddle manufacturer.

B. Check for leaks prior to backfilling as appropriate.

C. Tap pipe with tools and by methods specifically furnished by pipe manufacturer.

D. For PVC and AC pipe use tapping machine with smooth strap retainer (chains or other devices that may gouge or score the pipe shall not be used).

END OF SECTION

SECTION 02650BURIED UTILITY MARKINGSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
- B. This work shall consist of providing and installing utility line markings above all buried lines installed as part of this contract as indicated on the Drawings and replacing existing markings disturbed as part of this contract. Related Work Specified Elsewhere:

PART 2 - PRODUCTS2.1 MATERIALS

- A. Materials and color shall be in accordance with latest AASHTO specifications for pipe and utility marking.
- B. Marking tape color shall be in accordance with latest American Public Works Association (APWA) Uniform Color Code and American National Standards Institute ANSI Standard Z535.1, Safety Color Code specifications for buried utility marking as noted in the Schedule below.
  - 1. Schedule

<b>Marker Color</b>	<b>Buried Utility</b>
Blue	Potable Water & Associated lines
Green	Sanitary Sewers, Storm Drain and other Drain lines
Orange	Telecommunication, signal, alarm
Purple	Reclaimed, Recycled, Irrigation Water and Slurry Lines
Red	Electric Power lines cables conduits and lighting cables
Yellow	Gas, Oil, Steam, Petroleum or Gaseous Material Lines

- 2. Warning Information shall be in Black Letters with typical wording of:
  - a. "CAUTION: BURIED (NAME OF UTILITY LINE) BELOW"
- C. For ferrous pipe material use 0.004" minimum polyethylene film; 6" wide clearly marking type of buried utility.
- D. For non-ferrous pipe material (e.g. Concrete, PVC, PE, etc.) use detection tape composite of polyethylene and metallic core 6" wide clearly marking type of buried utility.
- E. Seton Identification Products, New Haven, CT, Utility Safeguard LLC or equal.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Marking tape shall be installed over utility lines centerline and buried 24" below grade.
- B. Markings damaged during opening of trench shall be reinstalled with 2' overlap at broken sections.

END OF SECTION

SECTION 02675CLEANING, TESTING AND DISINFECTION OF WATER MAINSPART 1 GENERAL1.1 DESCRIPTION

- A. The work of this section includes the furnishing of all labor, tools, equipment and materials and performing all operations necessary for the flushing, pressure testing, leakage testing and chlorination of water mains as specified herein and as required to complete the work.

1.2 QUALITY ASSURANCE

- A. Standards (as applicable):
1. All work shall be in accordance with this specification and AWWA C651. Where conflicts appear between these specifications and AWWA C651 the more stringent requirement shall apply.
  2. Chlorine solution for disinfecting water mains and appurtenances shall be made from either liquid sodium hypochlorite, or solid calcium hypochlorite, which shall conform to the latest AWWA B300 Standard for Hypochlorite.
  3. Chlorine test kits shall be as described in the current edition of AWWA M12 - Simplified Procedures for Water Examination.
  4. Disposal of chlorinated water as per AWWA C651, Appendix B.

1.3 COORDINATION

- A. Use of water will only be as approved and coordinated by the Owner.
- B. The Contractor shall employ an independent third party testing agency to conduct all flushing, pressure and leakage testing and chlorinating.
- C. All flushing, pressure and leakage testing and chlorinating shall be done by a third party testing agency in the presence of the Engineer and in the presence of the Owner or Owner's Representative in accordance with the requirements of the local and state plumbing codes and the appropriate Sections of these Specifications, at no additional cost to the Owner.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Each temporary blow-off shall consist of a corporation cock, type K copper tubing and a curb stop, each of not less than 1-inch diameter.
- B. A pumping unit or proportionate feeder suitable for delivering a hypochlorite solution to the isolated main shall be provided. The unit used shall prevent chlorine solution from flowing back into the existing system.

PART 3 - EXECUTION3.1 GENERAL

- A. Thoroughly clean all piping prior to testing. Remove all dirt, dust, oil, grease and other foreign material. Exercise care while cleaning to avoid damage to linings and coatings.
- B. Supply all labor, equipment, materials, gages, and pumps required to conduct the tests. The drawings do not detail taps, gages, plugs and other related materials required to perform testing. These materials are the responsibility of the Contractor.
- C. Flushing, testing and chlorinating of the mainline shall closely follow main laying work. As the mainline is installed, it shall be tested approximately every 1,000 feet, or between line valves, whichever is less. Should the mainlines fail to be flushed, tested, and chlorinated as specified, the main laying work shall be suspended until the flushing, testing and chlorinating is done.
- D. Final acceptance of the water main shall be based on successful (negative) results of bacteriological tests, which shall be done on samples taken from the main following chlorination and final flushing. Locations of samples shall be determined by the Engineer.
- E. The testing and related procedures described herein, shall be performed in the order listed.
- F. The Contractor, with the assistance of the Owner, shall fill mains as slowly as practicable so as not to cause dirty water and serious pressure drops within the existing system.

3.2 FLUSHING

- A. All new water mains, and existing water mains that have been drained and cut-into for making connections, shall be thoroughly flushed prior to pressure or leakage testing or final chlorination. Flushing shall be accomplished by partially opening and closing valves, hydrants, and blowoffs, several times, under expected line pressure, with flow velocities of not less than 2.5 feet per second, in the main. The size and number of hydrant outlets and/or main taps to provide the required flow (at 40 psi residual pressure) is as follows:

Minimum Required Flow and Openings Required to Flush Water Mains  
(Assuming 40 psi Residual Pressure in Water Mains)

Main Diameter (in.)	Flow Required to Produce 2.5 fps in Main (gpm)	Minimum Size of Taps (in.)	Hydrant Outlets	
			Number	Size (in.)
4	100	15/16	1	2-1/2
6	220	1-3/8	1	2-1/2
8	390	1-7/8	1	2-1/2
10	610	2-5/16	1	2-1/2
12	880	2-13/16	1	2-1/2
16	1565	3-5/8	2	2-1/2

1. If less than a 40 psi residual is available in the main, with the size tap shown above then a larger, or more tap(s) or hydrant outlets will be required, as determined by the Engineer.
2. The length of time for flushing, at or above the minimum allowable velocity, shall be computed to allow a minimum of 3 times the total volume of water in the main to be flushed to waste. Flushing shall be done in the presence of the Engineer.

### 3.3 AIR REMOVAL

- A. Following flushing, and before applying the specified test pressure, air shall be completely expelled from the mains, valves, and hydrants. After all air has been expelled, the air blowoffs can be closed, and the test pressure applied.

### 3.4 PRESSURE TEST

- A. All new water mains, or any sections thereof, shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure that will exist at the point of testing, or 150 psi, whichever is greater. Test pressures shall meet the following requirements:
  1. Be of at least 2-hour duration.
  2. Be not less than 1.25 times the expected system working pressure at the highest point along the test section.
  3. Not exceed main or thrust-restraint design pressures.
  4. Not vary by more than + 5 psi for the duration of the test.
  5. Not exceed 2-times the rated pressure of the valves or hydrants when the pressure boundary includes closed valves or hydrants. Valves shall not be operated in either direction at differential pressure greater than the rated pressure.
  6. Not exceed 1.5-times the rated pressure of the valves when the pressure boundary of the test section includes closed butterfly valves or resilient seated gate valves.
- B. Each section of main shall be slowly raised to the specified test pressure for two separate periods. The first period shall be for 15-minutes, after which the pressure shall be allowed to drop slowly back to system pressure. The pressure shall then be slowly raised again to the specified test pressure and maintained for 2-hours. The test pressure shall be based on the elevation of the lowest point of the main, in the test section and shall be corrected to the elevation of the test gauge, as directed by the Engineer. The test pressure shall be applied by means of a pump connected to the main, in an approved manner, and which will prevent any backflow into the existing system. Valves shall not be operated in either the closing or opening direction, at differential pressure greater than the rated pressure.
- C. Any exposed main, fittings, valves, hydrants and joints shall be carefully examined during the test. Any damaged or defective main, fittings, hydrants, or valves discovered following, or as a result of the pressure test shall be repaired or replaced with sound material. If faulty materials are removed and replaced, the pressure testing procedure shall be repeated.

### 3.5 LEAKAGE TEST

- A. Leakage testing shall be conducted concurrently with the pressure test.
- B. Leakage is defined as the quantity of water that must be pumped into the new main during the test, or any section thereof, required to maintain pressure within 5 psi of the starting test pressure. Leakage shall be recorded to the nearest one-tenth of a gallon. The Contractor shall employ qualified personnel throughout the testing. Leakage shall not be measured by a drop in pressure over a period of time.
- C. Leakage in the test section must be less than an amount determined as follows:

$$L = \frac{SD(P^{0.5})}{148,000}, \text{ where}$$

L = allowable gallons of leakage per hour

S = the length of main tested, in feet

D = the nominal main diameter in inches

P = the average test pressure during the test, in psi

- D. The leakage formula is based allowable leakage of 11.65 gallons per day, per mile of main, per inch (nominal) of main diameter, at a pressure of 150 psi. Allowable leakage under various conditions is shown below.

#### Allowable Leakage (gph) per 1,000 Feet of Mainline

Average Test Pressure(psi)	Nominal Diameter (inches)						
	6	8	10	12	16	20	24
250	0.64	0.85	1.07	1.28	1.71	2.14	2.56
225	0.61	0.81	1.01	1.22	1.62	2.03	2.43
200	0.57	0.76	0.96	1.15	1.53	1.91	2.29
175	0.54	0.72	0.89	1.07	1.43	1.79	2.15
150	0.50	0.66	0.83	0.99	1.32	1.66	1.99
125	0.45	0.60	0.76	0.91	1.21	1.51	1.81
100	0.41	0.54	0.68	0.81	1.08	1.35	1.62

- 1. If the mainline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.
- 2. When testing against closed metal seated valves, an additional leakage shall be allowed per closed valve of 0.0078 gallons per hour, per inch of nominal valve diameter.
- 3. When hydrants are in the test section, the test shall be made against the closed hydrant(s).
- E. Acceptance shall be determined on the basis of allowable leakage. If leakage in any test is greater than that specified, the Contractor shall locate and make repairs as necessary until the leakage is within the specified allowance.
  - 1. All visible leaks are to be repaired regardless of the amount of leakage.

2. All water mains shall be pressure and leakage tested in the presence of the Engineer, in order to qualify for acceptance.

### 3.6 CHLORINATION

- A. The method of chlorination shall be the *Continuous Feed Method* as described hereinafter. Chlorination procedures will not be allowed until acceptable flushing and pressure testing has been performed and accepted. The continuous feed method consists of the following steps:
  1. Prior to the application of chlorine, confirm that valves are closed to prevent back-feeding chlorine solution into the existing system.
  2. At a point not more than 10 feet downstream from the beginning of the new main, fill the main with chlorinated potable water, having an initial concentration of 25 mg/l free chlorine residual.
    - a. Water from the existing distribution system or other approved source of supply shall flow at a constant measured rate, into the new main. In the absence of a meter, the rate may be approximated by measuring the discharge rate at the end of the test section with a pito-gauge or by measuring the time to fill a container of known volume.
  3. The application of chlorine solution shall continue until the entire main is filled with water having 25 mg/l of free available chlorine. To assure that 10 mg/l free chlorine residual concentration is achieved throughout the test section, the Contractor shall measure chlorine concentration at regular intervals.
- B. The amount of chlorine required to obtain a concentration of 25 mg/l per 100 feet of various diameter mains is as follows.

#### Chlorine Required to Obtain 25 mg/l per 100 feet of Various Diameters

Main Diameter (inches)	Sodium Hypochlorite (gallons)				Calcium Hypochlorite (ounces)
	5% Available Chlorine	10% Available Chlorine	12.5% Available Chlorine	15% Available Chlorine	65% Available Chlorine
4	0.03	0.02	0.02	0.01	0.02
6	0.08	0.04	0.03	0.03	0.75
8	0.13	0.07	0.06	0.06	1.30
10	0.20	0.10	0.09	0.07	2.10
12	0.28	0.15	0.12	0.10	2.90
16	0.50	0.25	0.22	0.17	5.30
20	0.80	0.40	0.34	0.28	8.40
24	1.30	0.60	0.50	0.40	12.00

1. The above quantities are to be added to a sufficient quantity of water, dissolved, and mixed. The solution shall be injected into the main as specified.



2. The quantities shown are based on concentrations of available chlorine by volume. Extended or improper storage may have caused a loss of available chlorine.
- C. The chlorinated water shall be retained in the main for a minimum of 24-hours. At the end of this 24 hour period, retest portions of the main to confirm that a minimum of 10 mg/l free available chlorine residual exists in the main. If the residual chlorine is less than 10 mg/L, acceptable bacteria results may not be obtained.

### 3.7 FINAL FLUSHING OF CHLORINATED WATER

- A. After the initial 24-hour period period, the heavily chlorinated water shall be flushed from the main until chlorine measurements show the concentration in water leaving the main is no higher than that generally prevailing in the system.
- B. The Contractor shall obtain approval of location(s) for discharging the heavily chlorinated water, which will result from the chlorination procedures. Great care shall be exercised in the selection of the rate of flow and the discharge points, in order to minimize complaints, and damage to public or private property.
- C. The heavily chlorinated water shall be suitably and thoroughly neutralized prior to disposal into the environment. In no case shall chlorinated or neutralized water be discharged directly into a water body. If necessary, state, federal, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

### 3.8 BACTERIOLOGICAL TESTS

- A. After final flushing and before the water main is placed in service, water samples shall be collected twice (24-hours apart) by the Engineer or Owner and tested for bacteriological quality in accordance with standard methods. Water samples shall show the absence of coliform organisms and background bacteria.
- B. If, during construction, trench water has entered the main, or if in the opinion of the Engineer excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at intervals of approximately 200 feet and shall be identified as to location. Samples shall be taken of water that has stood in the main for at least 24-hours after final flushing has been completed.
- C. Samples shall be obtained through a corporation cock and copper tubing installed by the Contractor.
- D. The Engineer or Owner shall deliver samples to a laboratory approved by the Department of Health Services for bacterial analysis. The Owner shall pay for the cost of analysis. Only after each consecutive sample is approved shall the mains be incorporated into the water system. In the event that positive reports of contamination are received, the mains shall be flushed and chlorinated as many times as may be necessary to obtain approved (negative) results.

### 3.9 RE-CHLORINATION

- A. If the initial chlorination fails to produce satisfactory bacteriological samples, the main shall be re-flushed and re-sampled.

### 3.10 CHLORINATION PROCEDURES WHEN CUTTING INTO OR REPAIRING EXISTING MAINS

- A. Trench Treatment. If during excavation the trench is either wet or filled with water, it is recommended that liberal quantities of hypochlorite tablets be applied to open trench areas to lessen the danger from pollution.
- B. The interior of all main and fittings used in making a repair shall be swabbed or sprayed with a 1 percent hypochlorite solution before they are installed.
- C. If valve and hydrant locations permit thorough flushing toward the work location from both directions, it shall be done. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.
- D. Slug Chlorination. Where practical and in addition to the procedures above, a section of main in which the break is located shall be isolated. All service connections shall be shut off, and the section flushed and chlorinated by the *Slug Chlorination* method. This method allows the chlorine dose to be increased to as much as 300 mg/l, and the contact time reduced to as little as 1-hour. After chlorination, the section shall be properly flushed until discolored water is eliminated and the water is free of noticeable chlorine odor.
- E. Bacteriological samples shall be taken after repairs. If the direction of flow is unknown, samples shall be taken on each side of the main break. If positive samples are recorded, daily sampling shall be continued until two consecutive negative samples are recorded.

END OF SECTION

SECTION 03300ACAST-IN-PLACE CONCRETEPART 1 - GENERAL1.1 SECTION INCLUDES

- A. Cast-In-Place Concrete
- B. Formwork
- C. Concrete reinforcement and accessories
- D. Modifications and/or Repairs to concrete
- E. Concrete curing
- F. Concrete finishing
- G. Concrete repairs
- H. Concrete testing
- I. Non-Shrink Grout

1.2 REFERENCES

- |    |                        |   |
|----|------------------------|---|
| A. | ACI 211.1-91           | Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete  |
| B. | ACI 301-05             | Standard Specifications for Structural Concrete   |
| C. | ACI 302.1R-04          | Guide for Concrete Floor and Slab Construction  |
| D. | ACI 304.2R-96          | Placing Concrete by Pumping Methods   |
| E. | ACI 305R-99            | Hot Weather Concreting  |
| F. | ACI 306.1-90           | Standard Specification for Cold Weather Concreting                                      |
| G. | ACI 308R-01            | Guide to Curing Concrete  |
| H. | ACI 308.1-98           | Standard Specification for Curing Concrete  |
| I. | ACI 309R-05            | Guide for Consolidation of Concrete   |
| J. | ACI 318-05/318R-05     | Building Code Requirements for Structural Concrete and Commentary                       |
| K. | ACI 347R-03            | Guide to Formwork for Concrete  |
| L. | ASTM A82-02            | Specification for Steel Wire, Plain, for Concrete Reinforcement                         |
| M. | ASTM A615/<br>A615M-03 | Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement     |
| N. | ASTM C31/C31M-03a      | Standard Practice for Making and Curing Concrete Test Specimens in the Field            |
| O. | ASTM C33-03            | Specification for Concrete Aggregates   |
| P. | ASTM C39/C39M-04a      | Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens         |
| Q. | ASTM C42/C42M-03       | Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete |
| R. | ASTM C94/C94M-04a      | Specification for Ready Mixed Concrete  |
| S. | ASTM C150-02a          | Specification for Portland Cement   |
| T. | ASTM C172-99           | Practice for Sampling Freshly Mixed Concrete  |
| U. | ASTM C231-04           | Test Method for Air Content of Freshly Mixed  |

- Concrete by the Pressure Method
- V. ASTM C260-01 Specification for Air Entraining Admixtures for Concrete
  - W. ASTM C309R-98a Guide for Consolidation of Concrete
  - X. ASTM C494/  
C494M-99a Specification for Chemical Admixtures for Concrete
  - Y. ASTM C1107 Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  - Z. ASTM E 329-02 Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
  - AA. ASTM F1554-02 Standard Specifications for Anchor Bolts, Steel, 36, 55 and 105-KSI yield strength
  - BB. Concrete Reinforcing Steel Institute - Manual of Standard Practice
  - CC. Concrete Reinforcing Steel Institute - Placing Reinforcing Bars

### 1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301 and ACI 318 as modified here-in.
- B. Maintain copies of ACI 301 and ACI 318 on site.

### 1.4 QUALIFICATIONS OF INDEPENDENT TESTING LABORATORY

- A. Independent Testing Laboratory shall conform to concrete testing requirements of ASTM E329.
- B. Key personnel must be qualified and experienced in concrete quality assurance.
- C. Perform concrete field quality control testing with personnel certified as an ACI Concrete Field Testing Technician, Grade 1 according to the American Concrete Institute (ACI).

### 1.5 SUBMITTALS

- A. Submit shop drawings for concrete reinforcement prior to fabrication, showing bar bends, details and placement.
- B. Submit Concrete Mix designs including past field performance test results.
- C. Submit sieve analysis and soundness tests for fine and coarse aggregates taken within the last three (3) months.
- D. Submit Cement Manufacturer's Certificates of conformance with ASTM C150 taken during the last 3 months.
- E. Submit sample concrete mix delivery slip.
- F. Submit product data for concrete curing, sealing and hardening compounds.
- G. Independent Testing Laboratory will submit one copy each of all test reports to each of the following: Engineer, Resident Project Representative, Contractor and Concrete Supplier.
- H. Independent Testing Laboratory will submit reports within 5 days of testing or inspection.
- I. Independent Testing Laboratory will telephone the Engineer within 24 hours if tests indicate deficiencies.

## PART 2 - PRODUCTS

### 2.1 FORM MATERIALS

- A. Plywood: APA, B-B Plyform Class I exterior.
- B. Lumber: Southern pine, No. 2 grade or equal.
- C. Steel: Minimum 16 ga. sheet, well matched, tight fitting, stiffened to resist loads without excess deflection.
- D. Form Ties: Factory fabricated assembly providing at least 1.5 inch break back dimension with at least a 1 inch diameter conical wood or plastic cones to leave a uniform hole for patching. Single rod ties require a tightly fitted waterstop washer at the mid point. Multi rod ties do not require washers.
- E. Form release agent: non-staining colorless, compatible with finishes. CRETE-LEASE 727 Release Agent by Cresset Chemical Co., Super-X Emulsive by A.H. Harris & Sons, Inc. or equivalent.
- F. Conform to ACI 301 and ACI 347

### 2.2 REINFORCING STEEL

- A. Bars: ASTM A615 Grade 60; deformed new materials.
- B. Tie wire: ASTM A82, annealed.
- C. Bolsters, chairs and supports: plastic coated, stainless steel, or epoxy coated.
- D. Conform to CRSI Code of Standard Practice-Fabrication.

### 2.3 CAST-IN-PLACE CONCRETE

- A. Concrete Materials
  - 1. Portland cement: ASTM C150; Type II. Tricalcium Aluminate (C<sub>3</sub>A) content in cement less than 8%.
  - 2. Aggregates:
    - a. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specification C-33.
    - b. Coarse aggregate shall consist of a well graded crushed stone or a washed gravel conforming to the requirements of ASTM Specification C-33.
  - 3. Water: potable from municipal water supply or equal.
  - 4. Admixtures: All from one common manufacturer.
- B. Admixtures
  - 1. Low Range Water Reducer: Pozzolith 122-N by Master Builders; WRDA with HYCOL by Grace Construction Products Division; or equivalent meeting ASTM C494 Type A
  - 2. High Range Water Reducer (superplasticiser): Rheobuild 1000 by Master Builders; Daracem 100 by W.R. Grace; or equivalent meeting ASTM C494 Type F.
  - 3. Air entraining agent: Micro-Air by Master Builders, DAREX 11 AEA by Grace Construction Products; or equivalent meeting ASTM C260.
  - 4. Non-corrosive non-chloride accelerator: Pozzutec 20 by Master Builders; or equivalent meeting ASTM C494 type C or E.

5. Not permitted: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions.

C. Concrete

1. Concrete Class
  - a. Reinforced concrete sections: Class A
2. Concrete proportioning shall conform to ACI 318, Chapter 5 except as modified below:

Class	Minimum Compressive Strength (f <sub>c</sub> )	Coarse Aggregate Size	% Air ±(1.5%)	Min.- Max. Slump	Min.- Max. Cem.Fac.	Max. W/C	High Range Water Reducer
A	4000 PSI	No. 67 (¾")	6	1-3	564-620	0.42	Yes

3. The maximum slump as indicated in the above table will be as measured at the batch plant.
4. Pumped Concrete: Conform to Chapter 4 - ACI 304.2
5. High range water reducer shall be added on site to obtain 4" - 8" slump.
6. No water shall to be added on site.
7. Concrete shall be furnished from one source during the project.

D. Selection of Concrete Proportions

1. The Concrete producer shall select the concrete mix proportions on the basis of past field performance or the use of trial mixes in accordance with ACI 318 Sections 5.2, 5.3 and 5.4.

2.4 ACCESSORIES

- A. Joint filler and slab perimeters: J-Joint polyethylene foam with tear off strip for sealant or approved equal; joint filler to be slab thickness in depth less 0.5 inch for sealant.
- B. Expansion joint filler: Self expanding cork by W.R. Meadows or W.R. Grace or equal, size as indicated on the Drawings.
- C. Bond Breaker: Thompson's Water Seal or equivalent, or form oil.
- D. Concrete Anchorage Fasteners:
  1. Expansion Anchors - Stainless steel AISI Type 316. Kwik-Bolt by Hilti Fastening Systems or Tru Bolt by Ramset Fastening System or equivalent.
  2. Anchor Rods - ASTM F1554 Grade 55.
  3. Adhesive Anchors. Non-expanding chemical type, 6" minimum projection and nut; Parabond Capsule Anchor by Molly Fastener or HVA Adhesive Anchor by Hilti Fastening Systems or equivalent.

2.5 NON-SHRINK GROUT

- A. Conform to ASTM C1107.
- B. Install in accordance with manufacturer's recommendations, using appropriate grout for intended use.

2.6 LIQUID CURING COMPOUND MATERIALS

- A. Curing and Sealing Compound; ASTM C309 Type 1 Class B. Super Kurseal by A.H. Harris & Sons, Inc. Emulsion Kurseal 309 by A.H. Harris & Sons, Inc. or equivalent.
- B. Dissipating Resin Curing Compound: ASTM C1315 type 1; Film must break down in two to four weeks. Kurez-DR by Euclid Chemical Company, Emulsion Super KonKure 309 clear by A.H. Harris & Sons, Inc., or equivalent.
- C. Curing/Hardening Compound: Sodium Silicate Type. Eucosil by Euclid Chemical Company, Super KurHard 309 by A.H. Harris & Sons, Inc., or equivalent.

2.7 FINISHING MATERIALS

- A. Slab Sealer: Siloxane based 96% chloride ion screen, Euco-Guard-100 by Euclid Chemical or equal.
- B. Bonding Admixture: Latex, non-rewettable type SBR Latex or Flex-con by Euclid Chemical, Daraweld C by W.R. Grace or equivalent.
- C. Patching Mortar: 1 part of a mixture of white and grey portland cement to 2.5 parts of damp loose sand. Cement type to match substrate.

2.8 REPAIR MATERIALS

- A. Epoxy Adhesive: Water Based epoxy resin/portland cement building agent Armatec 110 by Sika Corporation or equivalent.
- B. Repair Mortar: polymer improved, cementitious, 2 component, trowel grade mortar equal to Concrete Coat by Euclid Chemical; Sikatop 122 by Sika Corp. or equivalent.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Conform to ACI 301 and ACI 347
- B. Erect plumb and straight. Maintain rigid. Brace sufficiently.
- C. Allow no concrete leakage. Provide continuous, straight, smooth exposed surfaces.
- D. Treat forms with form release agent. Protect reinforcing from contact with form release agent.
- E. Earth forms not permitted.
- F. Chamfer all exposed outside corners and edges 0.75 inch unless otherwise noted.
- G. Clean out inside of forms of all foreign materials prior to concrete placement.
- H. Maintain forms and shores supporting the cast concrete for the time periods indicated:
  - 1. Walls and Vertical Surfaces \*36 Hours
    - \* These periods represent cumulative number of days or hours during which the temperature of the air surrounding the concrete is above 50°F and the concrete has been damp and no loss of moisture has occurred.
- I. Form pressures increase with the use of concrete with High Range Water Reducers. Design forms accordingly.

- J. All concrete formwork, including reinforcing steel and embedment items, shall have a temperature greater than or equal to 35°F at the time of concrete placement.

### 3.2 REINFORCEMENT

- A. Conform to the CRSI Code of Standard Practice - Field Erection for surface condition, bending, spacing and placement tolerance.
- B. Splicing reinforcement: conform to ACI 318; welded wire fabric to be lapped 1½ courses or 12 inches; tie fabric at 24 inches on center maximum spacing.
- C. Provide bar supports: on grade use concrete brick; elsewhere use manufactured wire supports.
- D. Do not bend reinforcing partially embedded in the concrete.

### 3.3 EMBEDDED ITEMS

- A. Coordinate installation of embedded items.
- B. Pipes or Conduits for embedment within a slab, wall or beam, other than those merely passing through, shall satisfy the following:
  - 1. Shall not be larger in outside diameter than one-third (1/3) the thickness of the slab, wall or beam.
  - 2. Shall not be spaced closer than 3 diameters on center.
  - 3. Shall not impair significantly the strength of the concrete.

### 3.4 PLACING CONCRETE

- A. Notify Engineer and Independent Testing Laboratory 24 hours minimum prior to each placement.
- B. Place no concrete on frozen ground.
- C. Place concrete within 90 minutes of batching.
- D. Freefall: 4 feet maximum.
- E. Do not place partially hardened concrete.
- F. Consolidate concrete by vibrating. Conform to ACI 309.
- G. Conform to ACI 306R for cold weather concreting.
- H. Conform to ACI 305R for Hot Weather Concreting. Temperature of concrete placed shall not exceed 90°F.
- I. Provide concrete Delivery Slip prepared at batch plant with each truck load of concrete showing ticket number, date, truck number, mix strength, maximum stone size, weight of coarse aggregate, weight of fine aggregate, cement weight, volume of concrete, gallons of water added at plant, time water added at plant, quantities of all admixtures used and gallons of water withheld at the plant.
- J. Thoroughly moisten subgrade materials prior to placing slabs on grade.

### 3.5 TESTING CAST-IN-PLACE CONCRETE

- A. An Independent Testing Laboratory, selected and paid for by the Owner, shall test and sample concrete for strength, slump and air content as follows:
- B. Obtain 5 standard test cylinder samples (6" x 12") of each 100 cubic yards or less of each class of concrete placed in any one day.



- C. Test 2 cylinders at 7 days; 2 cylinders at 28 days. Hold one cylinder for later testing.
- D. Perform slump tests and air entrainment tests on each truck and at each sampling. Perform slump and air entrainment tests before addition of High Range Water Reducer and after addition of High Range Water Reducer.
- E. Sample concrete for testing of air and slump at the discharge end of the truck. When concrete is pumped, concrete taken for test cylinders shall be at the discharge end of the pump hose.
- F. Perform strength, slump and air entrainment tests at other times when directed by the Engineer.
- G. Contractor shall provide and maintain an insulated, heated concrete cylinder curing box, 4 foot square minimum, with a min.-max thermometer and maintain the temperature between 60°F and 80°F. Contractor to coordinate location with Engineer and Independent Testing Laboratory.
- H. Additional testing and sampling required as a result of deficient results or improper curing shall be paid for by Owner. The cost of resampling and retesting will be determined by Engineer, and Owner will invoice Contractor for this cost. If unpaid after 60 days, this invoice amount will be deducted from the Contract Price.

### 3.6 ADDITIONAL CONCRETE TESTS

- A. Independent Testing Laboratory shall provide additional testing of in-place concrete as directed by Engineer due to non-compliance or considered substandard. Additional tests may consist of non-destructive testing, cores drilled from the area in question or load tests. Costs of additional testing will be paid by Contractor.
- B. When the concrete strength is substandard as defined in Specification 03300 Section 3.12 paragraph A, concrete core specimens shall be obtained and tested from the affected area.
  - 1. Three (3) cores shall be taken for each sample in which the strength requirements were not met. The drilled cores shall be obtained and tested in conformance with ASTM C 42 "Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."
- C. Field cured cylinders may be cast and tested by the Independent Testing Laboratory at the request of the Contractor. The costs of these tests shall be borne by the Contractor. If the field cured cylinders are cast and tested prior to 28-days to determine the in-place concrete strength in order to facilitate an accelerated schedule for subsequent concrete placements, backfilling or leakage testing, the following criteria must be met:
  - 1. The Contractor shall notify the Engineer and Independent Testing Laboratory 48 hours in advance of the concrete placement. The Engineer will determine at that point if the results of the field cured cylinders may be used to determine the in-place concrete strength. The Contractor shall notify the Engineer as to when the field cured cylinders will be tested and for what purpose.
  - 2. A minimum of 2 cylinders shall be cast for each separate test the Contractor requests. A test consisting of at least two cylinders will be required to be considered valid.

3. The field cured cylinders shall be left in the field and located such that they are exposed to the identical environmental conditions as the concrete structure. The cylinders shall remain at this location a minimum of 14 days prior to testing.
4. The Engineer shall determine if the strengths indicated by the field cured cylinder tests are adequate for their intended purpose.

### 3.7 FINISHING SLABS AND FLATWORK

- A. Screed to bring concrete surface to proper contour and elevation.
- B. Highway straightedge, bull float or darby float the concrete surface immediately after screening.
- C. Allow bleed water to evaporate or remove.
- D. (STF) Steel Troweled Finish: Float the surface with magnesium or cast aluminum float or with a power finishing machine. Steel trowel surface immediately after floating to produce smooth surface. Steel trowel again after concrete has hardened enough so that mortar does not adhere to trowel edge. Ringing sound should be apparent when performing second troweling due to tilted, compacting motion.
- E. (WFF) Wood Float Finish: allow concrete to stiffen; float surface twice or more to a uniform sandy texture.
- F. Tolerances for trowel finished floors: ACI 302 class BX. 5/16 inch maximum deviation from 10 foot long straightedge placed anywhere on the surface.

### 3.8 FINISHING VERTICAL SURFACES

- A. (RFF) Rough Form Finish: Repair structural defects only and patch tie holes. Fins exceeding 1/4 in. in height to be removed by grinding and/or rubbing.
- B. (SFF) Smooth Form Finish: The concrete surface shall be of uniform color, texture and free of all irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the minimum. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used. Remove fins flush by grinding and/or rubbing. Repair surface and structural defects as specified in this section.
- C. Curbs: Provide monolithic finish to curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations chamfered.

### 3.9 CURING

- A. Curing: Curing shall begin immediately following the initial set of concrete or after slab surface finishing has been completed and shall continue after form removal per Section 03300A, 3.1.H. All concrete shall be cured to attain strength and durability by one of the following methods for a minimum of seven days after placement regardless of the ambient air temperature:
  1. Ponding or continuous sprinkling. Intermittent wetting and drying is not an acceptable curing method.

2. Application of concrete curing compounds. If applying slab sealing compounds, use dissipating resin curing compound. Allow dissipating resin curing compound to chemically break-down, and remove residuals and other foreign material, prior to applying slab sealing compound.
- B. Moisture loss from surfaces placed against wooden or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal, the concrete shall be cured by one of the methods described above, for the balance of time remaining as specified above.
- C. Schedule of Finishes and Curing Requirements:
  1. Provide finishes on concrete surfaces according to the following schedule:

<u>Location</u>	<u>Finish</u>	<u>Curing Requirements</u>
Exterior Exposed Walls to 6" below grade	SFF	Moist cure or apply two coats curing and sealing compound.
Exterior unexposed walls	RFF	Moist cure or apply two coats curing and sealing compound.
Exterior slabs-on-grade	LBF	Moist cure and apply two coats of slab sealer
Slabs (not coated)	STF	Apply two coats of curing/hardening compound.
Equipment Pads	WFF	
Exterior Pads		Moist cure and apply two coats of slab sealer

- D. Cold Weather:
  1. Conform to ACI 306R
  2. Maintain concrete temperature between 50°F and 70°F for a minimum of seven days after placement, enclose and heat, insulate as required.
  3. Reapply curing compounds every two days during heating period.
  4. The maximum allowable temperature drop of the concrete surfaces during the first 24 hours after the end of the curing period shall not exceed 5°F in any 1 hour and shall not exceed a total of a 40°F drop in the first 24 hours.
- E. Hot Weather: Conform to ACI 305R Concrete temperature shall not be greater than 90°F. Protect from loss of slump, flash set, plastic cracking and rapid evaporation of water.

### 3.10 CORING OF HOLES

- A. Core drill holes where shown.
- B. Coring shall be performed with a non-impact rotary tool with diamond core drills, size shall be suitable for pipe conduit, sleeves or mechanical seals to be installed.

All equipment shall conform to OSHA standards. Protect all existing equipment, utilities and critical areas against water or other damage caused by the drilling operation.

- C. No structural members shall be cut without any exceptions taken by the Engineer.

3.11 TOLERANCES

- A. Maximum allowable deviations from dimensions, elevations, slopes and position shall conform to ACI 117. Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

3.12 FAILURE TO MEET STRENGTH REQUIREMENTS

- A. The strength of the concrete in place will be considered substandard if any one of the following results occur:
  - 1. The arithmetic average of 28-day cylinder tests for any three (3) consecutive test results are less than the specified strength ( $f'c$ ).
  - 2. More than 10 percent of the 28-day cylinder tests have strengths less than the specified strength ( $f'c$ ).
  - 3. An individual compressive strength test result falls below the specified strength ( $f'c$ ) by more than 500 psi.
- B. Concrete which fails to meet the strength requirements as outlined above will be reviewed by the Engineer. The Engineer will determine whether the substandard concrete will be accepted, rejected or additional tests performed.
- C. When Substandard concrete as defined in Parts A.1 and A.2 occurs, the Engineer will require corrective measures to be taken immediately in order to increase the average of subsequent strength tests. When substandard concrete as defined in part A.3 occurs, non-destructive testing shall be performed on the substandard concrete. The testing shall be performed by an independent firm elected by the Engineer and paid for by the contractor at no additional cost to the Owner.

3.13 DEFECTIVE CONCRETE

- A. Defective concrete is defined as concrete in place which does not conform to strength, shapes, alignments, appearances and/or elevation as shown on the drawings and/or presents faulty surface areas.
- B. Reinforcing steel size, quantity, strength, position, or arrangement at variance with the Drawings will be considered defective.
- C. Concrete which differs from the required dimensions or locations in such a manner as to reduce the strength will be considered defective.
- D. Concrete surfaces not finished or cured in accordance with this Section shall be classified as defective concrete.
- E. Formed surfaces larger or smaller than dimensional tolerances specified in this Division may be rejected. If the Engineer permits the Contractor to correct the error, such correction shall be as directed and in such a manner as to maintain the strength, function and appearance of the structure.

- F. Concrete members cast in the wrong location may be rejected and shall be removed at no additional cost to the Owner if the strength, appearance or function of the structure is adversely affected.
- G. Inaccurately formed surfaces exposed to view may be rejected and shall be repaired or removed and replaced at no additional cost to the Owner.
- H. Concrete exposed to view with defects which adversely affect the appearance of the specified finish shall be repaired. If, in the opinion of the Engineer, the defects cannot be repaired, the concrete may be accepted or rejected in accordance with the decision of the Engineer.

3.14 PROTECTION

- A. Protect concrete from high and low temperatures for seven days.
- B. Protect against vibration until concrete has attained 33% of its 28-day strength.
- C. Protect against premature loads until the 28-day strength has been attained.
- D. Concrete structures shall be covered, insulated and heated as required to prevent frost penetration beneath the structures until acceptance by the Owner.

END OF SECTION

**APPENDIX A**  
**Temporary Water Bypass Plans**

Connect 4-inch temporary main to existing hydrant

Install Temporary Hydrant

4-inch temporary main

2-inch temporary main (opposite side)

Connect 4-inch temporary main to existing hydrant

High Street

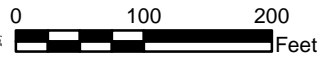
Cutter Street

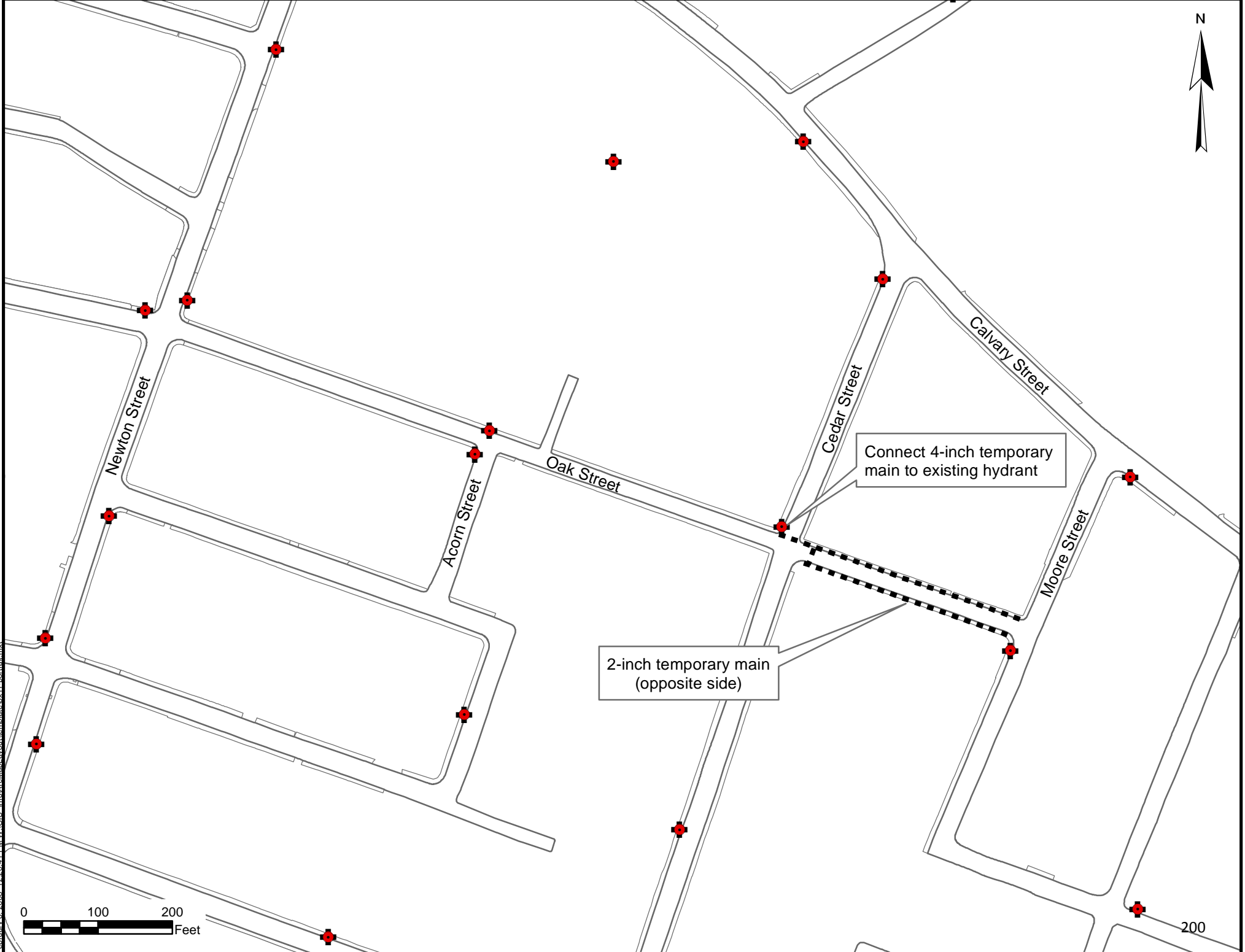
Cedar Street

Oak Street

Moore Street

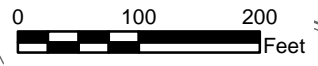
N





Connect 4-inch temporary main to existing hydrant

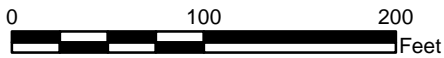
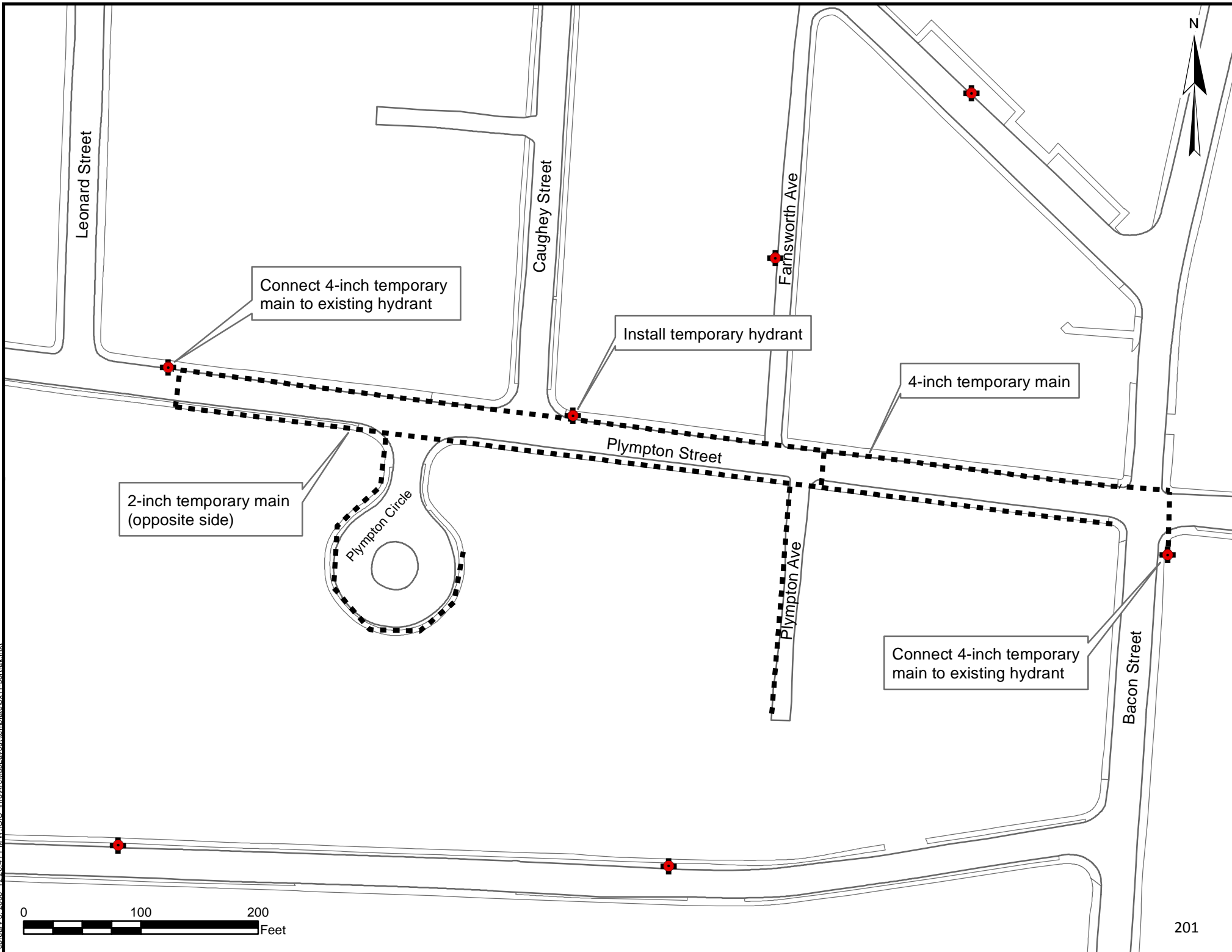
2-inch temporary main (opposite side)



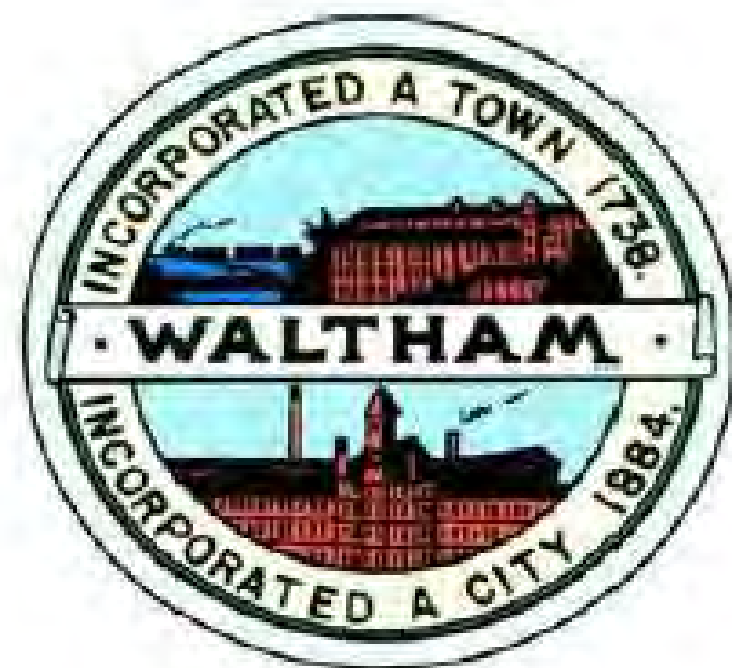
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# CITY OF WALTHAM, MASSACHUSETTS

## DRAWINGS FOR

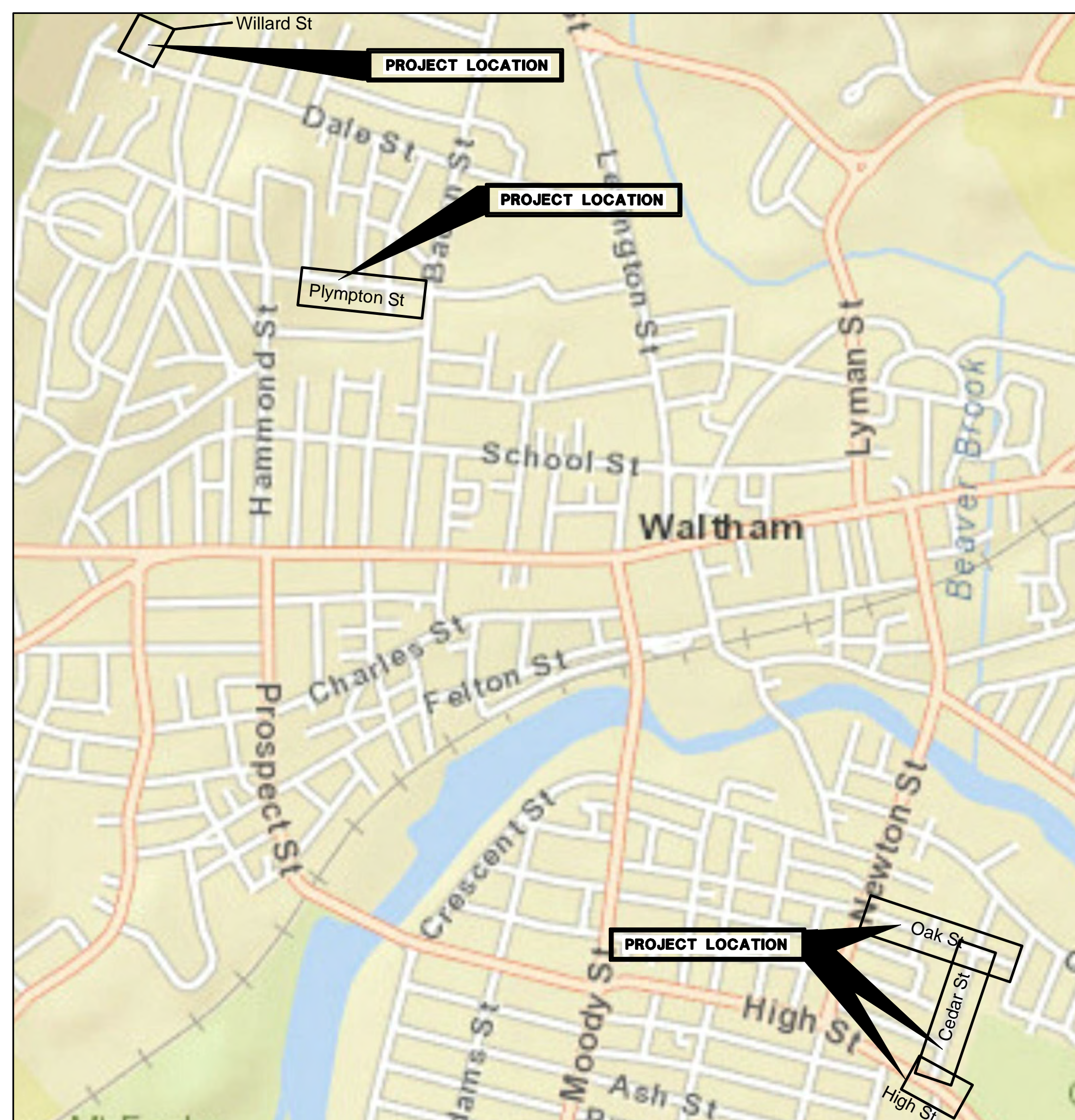
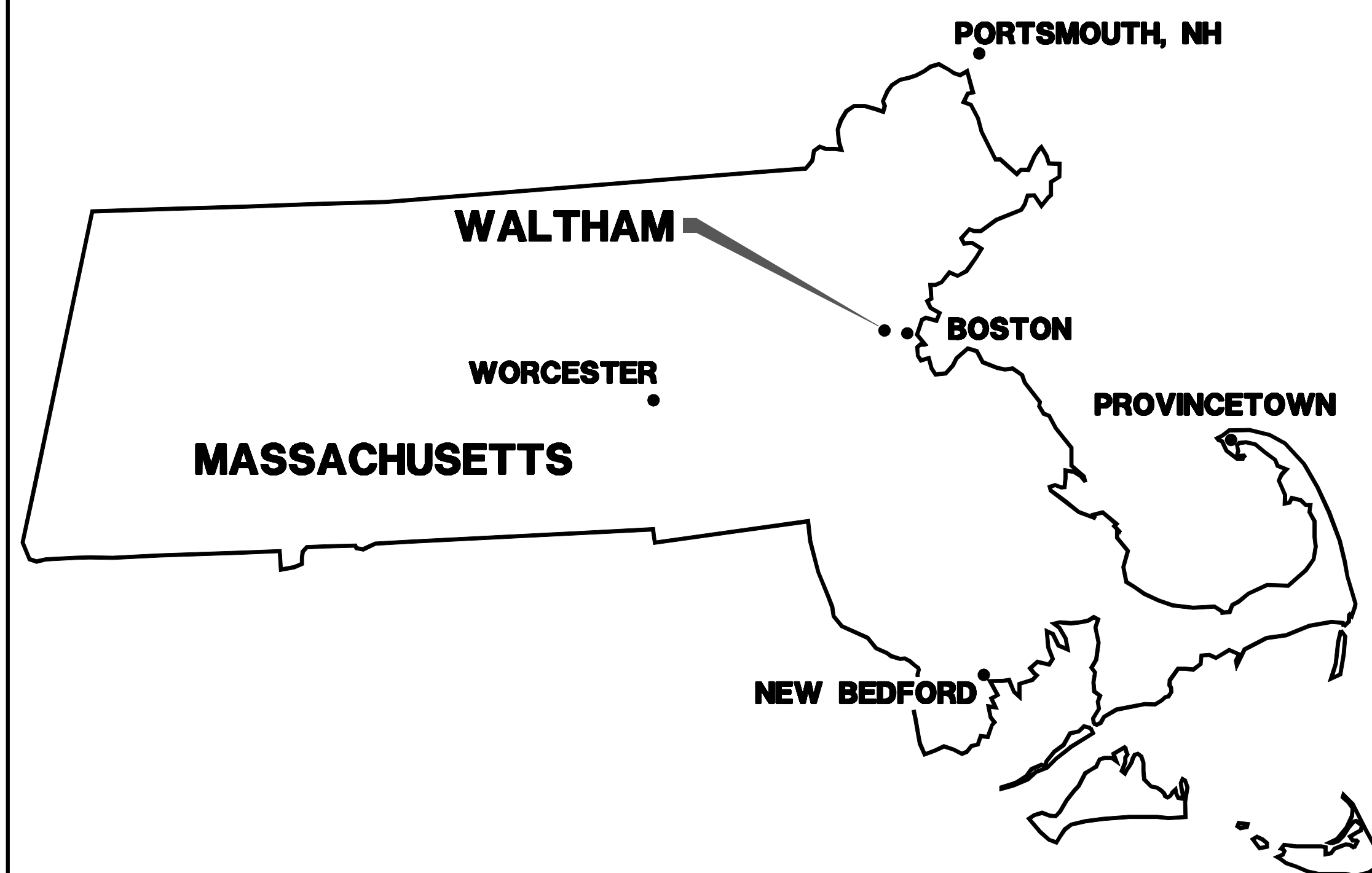
# WATER MAIN IMPROVEMENTS

## CEDAR STREET, OAK STREET, PLYMPTON STREET & WILLARD STREET

### APRIL 2014

#### DRAWING INDEX

SHEET	TITLE
-	COVER
<b>CIVIL</b>	
C-1	GENERAL NOTES, ABBREVIATIONS, AND LEGEND
C-2	CEDAR STREET WATER MAIN PLAN I
C-3	CEDAR STREET WATER MAIN PLAN II AND HIGH STREET WATER MAIN PLAN
C-4	OAK STREET WATER MAIN PLAN
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C-6	WILLARD STREET WATER MAIN PLAN
C-7	DETAILS I
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**LOCATION PLAN**  
SCALE: NTS

**CITY OF WALTHAM  
ENGINEERING DEPARTMENT  
119 SCHOOL STREET  
WALTHAM, MA 02451**



**MAYOR**  
**JEANNETTE A. McCARTHY**

**CITY COUNCIL MEMBERS**  
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FOR REVIEW 3-10-2014  
 FOR BIDDING 4-23-2014  
 WP PROJECT NO. 12858A

EXISTING CONDITIONS NOTES

- 1. THE LOCATIONS OF UNDERGROUND UTILITIES, STRUCTURES AND POWER LINES AS SHOWN ON THE DRAWINGS, ARE APPROXIMATE AND MAY NOT BE COMPLETE. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE BASED ON PREVIOUS CONSTRUCTION PLANS AND RECORDS. NO GUARANTEE IS MADE THAT UTILITIES OR STRUCTURES WILL BE ENCOUNTERED WHERE SHOWN OR THAT ALL UNDERGROUND UTILITIES AND STRUCTURES ARE SHOWN. ALL LOCATIONS AND SIZES OF EXISTING UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD WITH TEST PITS AS REQUIRED PRIOR TO BEGINNING CONSTRUCTION OF NEW PIPING THAT MAY BE AFFECTED. THE CONTRACTOR WILL REALIGN NEW PIPE LOCATIONS AS REQUIRED TO CONFORM TO EXISTING LINES AND AS APPROVED BY THE ENGINEER. UTILITY CONTACTS ARE AS FOLLOWS:
POLICE DEPARTMENT: 155 LEXINGTON STREET WALTHAM, MA 02452 TEL: (781) 893-3700
PUBLIC WORKS: 157 LEXINGTON ST. WALTHAM, MA 02452 TEL: (781) 314-3800
FIRE DEPARTMENT: 175 LEXINGTON STREET WALTHAM, MA 02452 TEL: (781) 314-371
WATER & SEWER DIVISION: 169 LEXINGTON ST WALTHAM, MA 02452 TEL: (781) 314-3820
GAS: NATIONAL GRID NORTHBOROUGH, MA 01532 TEL: 1-800-233-5325
ELECTRIC: NSTAR ONE NSTAR WAY WESTWOOD, MA 02090 TEL: 1-800-592-2000
CABLE: VERIZON: 1-800-837-4966 RCN: 1-800-746-4726 COMCAST: 1-800-266-2278
TELEPHONE: VERIZON 1-800-837-4966

- 2. SEWER SERVICE LOCATIONS ARE APPROXIMATE AND BASED ON CITY RECORDS. ACTUAL LOCATIONS SHALL BE VERIFIED BY THE CONTRACTOR.
3. NEW WATER SERVICE CONNECTIONS ARE SHOWN FOR ESTIMATING PURPOSES. THE ACTUAL LENGTH AND LOCATION SHALL BE FIELD VERIFIED AT THE TIME OF CONSTRUCTION. WATER SERVICE LOCATIONS ARE APPROXIMATE AND ARE BASED ON DISTRICT RECORDS.
4. PLANS DEVELOPED BASED ON SURVEY PROVIDED BY THE CITY OF WALTHAM, CITY OF WALTHAM GIS DATA, AND EXISTING RECORD DRAWINGS PROVIDED BY THE CITY OF WALTHAM.
5. THE CONTRACTOR SHALL EMPLOY A LICENSED SURVEYOR TO ESTABLISH VERTICAL CONTROL POINTS FOR CONSTRUCTION PURPOSES. THE ELEVATION OF EXISTING STRUCTURES TO BE TIED INTO SHALL BE CONFIRMED OR ESTABLISHED. VERTICAL CONTROL POINTS AND ELEVATIONS ON DRAWINGS ARE FOR DESIGN PURPOSES ONLY.

GENERAL CONSTRUCTION NOTES

- 1. THE CONTRACTOR SHALL NOTIFY RESIDENTS 48 HOURS IN ADVANCE OF WHEN CONSTRUCTION WILL BE OCCURRING IN PROXIMITY TO THEIR RESIDENCE OR BUSINESS.
2. ALL WATER SERVICES SHALL BE REPLACED FROM THE MAIN TO THE PROPERTY LINE. CONTRACTOR TO MAKE ALL CONNECTIONS TO THE EXISTING SERVICE PIPES. ALL SERVICE TAPS SHALL BE MADE "WET" AFTER THE NEW MAIN HAS BEEN TESTED AND PLACED IN SERVICE. SERVICES SHALL INCLUDE NEW CORPORATION, COPPER TUBING, CURB STOP, BOX, AND COUPLING FOR CONNECTION TO EXISTING SERVICE.
3. CLOSE AND REMOVE VALVE BOX ON ALL ABANDONED GATE VALVES ON EXISTING WATER MAINS.
4. REPLACEMENT OF EXISTING WATER MAIN SHALL INCLUDE REMOVAL AND LEGAL DISPOSAL OF AL EXISTING PIPING AND APPURTENANCES.
5. FLOWS FROM DEWATERING ACTIVITIES SHALL NOT BE DISCHARGED TO SANITARY SEWERS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE APPROPRIATE DISPOSAL OF FLOWS RESULTING FROM PRECIPITATION AND HIS DEWATERING OPERATIONS.
7. CONTRACTOR SHALL NOT TRACK OR SPILL EARTH, DEBRIS OR OTHER CONSTRUCTION MATERIAL ON PUBLIC OR PRIVATE STREETS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE IMMEDIATE ASSOCIATED CLEAN UP.
8. ALL TEST PITS SHALL BE EXCAVATED PRIOR TO CONSTRUCTION LAYOUT AND ACTUAL LOCATIONS OF SUBSURFACE UTILITIES SHALL BE REPORTED TO THE ENGINEER. WHERE APPROPRIATE, MINOR ADJUSTMENTS TO THE ALIGNMENTS OF PROPOSED LINES SHALL BE MADE TO ACCOMMODATE EXISTING UTILITIES AS APPROVED BY ENGINEER. ALL ADJUSTMENTS (NORTHINGS, EASTINGS AND ELEVATIONS) MUST BE DEPICTED IN THE RECORD AS-BUILT DRAWING DATA SUBMITTED TO THE ENGINEER FOR INCLUSION IN THE RECORD AS-BUILT DRAWINGS.
9. ANY EXISTING SEWERS, STORM DRAIN OR CULVERTS DAMAGED DURING CONSTRUCTION AND NOT TO BE REPLACED SHALL BE REPAIRED, STRUCTURE TO STRUCTURE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
10. DO NOT SCALE DRAWINGS UNLESS OTHERWISE NOTED. WRITTEN DIMENSIONS SHALL PREVAIL. REPORT ANY DISCREPANCIES IMMEDIATELY TO THE ENGINEER.
11. ALL STRUCTURES AND PIPELINES LOCATED ADJACENT TO THE TRENCH EXCAVATION SHALL BE PROTECTED AND FIRMLY SUPPORTED BY THE CONTRACTOR UNTIL THE TRENCH IS BACKFILLED. DAMAGE TO ANY SUCH STRUCTURES CAUSED BY, OR RESULTING FROM, THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. ALL UTILITIES REQUIRING REPAIR, RELOCATION OR ADJUSTMENT AS A RESULT OF THE PROJECT SHALL BE COORDINATED THROUGH THE RESPECTIVE UTILITY.
12. IN THOSE INSTANCES WHERE POWER OR TELEPHONE POLE SUPPORT IS REQUIRED, THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH UTILITY(S) ACCORDINGLY. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR TEMPORARY BRACING OF UTILITIES. THE CONTRACTOR SHALL COORDINATE RELOCATION OF TELEPHONE POLES WITH THE RESPECTIVE UTILITY.
13. ALL PIPING, EQUIPMENT AND MATERIALS TO BE DEMOLISHED AND/OR REMOVED FROM SERVICE SHALL BE COORDINATED WITH THE OWNER AND ENGINEER BEFORE COMMENCING THAT WORK. EXISTING PIPES DESIGNATED AS "ABANDONED" MAY BE REMOVED IF THE CONTRACTOR SO CHOOSES. IF ABANDONED PIPE CONFLICTS WITH PROPOSED PIPING, THEN A PORTION OF THE ABANDONED PIPE SHALL BE REMOVED. IN ALL CASES, ABANDONED PIPE TO REMAIN IN-PLACE SHALL BE FILLED AND PLUGGED IN IT'S ENTIRETY WITH CDF (CONTROLLED DENSITY FILL).
14. SEVERING OF EXISTING UTILITIES FOR ABANDONMENT, OR REMOVAL OF A SEGMENT FROM SERVICE, SHALL BE PERFORMED IN SUCH A MANNER AS TO ALLOW THE REMAINING ACTIVE SEGMENT TO CONTINUE IN ITS INTENDED SERVICE. CAP ACTIVE SEGMENTS WITH APPROPRIATE FITTINGS, JOINT RESTRAINT, ETC. TO ENSURE THEIR INTEGRITY.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND DISPOSING OF ALL DEMOLISHED PIPING, EQUIPMENT AND MATERIALS. DISPOSAL SHALL BE IN ACCORDANCE WITH ALL STATE AND LOCAL REGULATIONS. THE OWNER RESERVES THE RIGHT TO RETAIN ANY SUCH PIPING, EQUIPMENT AND MATERIALS DESIGNATED FOR DEMOLITION FOR HIS USE. SUCH MATERIALS TO BE RETAINED SHALL BE PROPERLY STORED IN AN ON-SITE LOCATION. COORDINATE LOCATION AND MATERIALS TO BE SALVAGED WITH THE OWNER/ENGINEER.
16. THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO ENSURE THAT ALL SEWER, WATER & DRAINAGE FLOWS ARE MAINTAINED DURING CONSTRUCTION. PRESSURE, GRAVITY OR PUMPED BYPASSES AND OTHER MEANS OF MAINTAINING FLOW SHALL BE SUBJECT TO THE REVIEW AND ACCEPTANCE OF THE ENGINEER. THE CONTRACTOR SHALL COORDINATE ANY TEMPORARY STOPPAGES OR BYPASSES WITH THE OWNER AND ENGINEER.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESETTLE ALL EXISTING PROPERTY MONUMENTATION THAT IS DISTURBED BY HIS OPERATIONS AT NO EXPENSE TO THE OWNER. THIS WORK IS TO BE DONE BY A LAND SURVEYOR LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS. PROPERTY BOUNDS FOUND ARE SHOWN ON LAYOUT PLANS, THIS MAY NOT BE INCLUSIVE OF ALL BOUNDS THAT EXIST IN THE PROJECT AREA. IF ANY ADDITIONAL BOUNDS ARE FOUND, THE CONTRACTOR SHALL DOCUMENT THE LOCATION AND NOTIFY THE ENGINEER.
18. THE CONTRACTOR IS TO TAKE SPECIAL CARE NOT TO DAMAGE TREES WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED.
19. APPROXIMATE LIMIT OF WORK ON PLANS IS INTENDED TO SHOW GENERAL SCOPE OF THE WORK. ACTUAL LIMITS OF THE WORK ARE TO BE DETERMINED IN THE FIELD TO MEET PROJECT NEEDS AS DETERMINED BY THE OWNER AND THE ENGINEER.

GENERAL CONSTRUCTION NOTES CONTINUED

- 20. EXISTING SIGNS THAT ARE IMPACTED BY THIS PROJECT SHALL BE RESET PER CITY STANDARDS AND IN ACCORDANCE WITH MASS. DOT AND M.U.T.C.D. (MANUAL UNIFORM TRAFFIC CONTROL DEVICES) ADDITIONAL SIGNS MAY BE REQUIRED AS DIRECTED BY THE ENGINEER.
21. COMPACTION TESTS SHALL BE PERFORMED IN ACCORDANCE WITH THE SPECIFICATIONS. ANY SETTLEMENT OCCURRING WITHIN ONE YEAR OF SUBSTANTIAL COMPLETION OF THE PROJECT WILL BE CORRECTED BY THE CONTRACTOR IN A MANNER ACCEPTABLE TO THE ENGINEER AT NO ADDITIONAL EXPENSE TO THE OWNER.
22. SUITABLE EXCAVATED MATERIAL MAY BE INCORPORATED IN THE PROJECT. THE CONTRACTOR SHALL DISPOSE OF EXCESS MATERIAL IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE CONTRACT DOCUMENTS AND ALL STATE, FEDERAL AND LOCAL REGULATIONS.
23. ALL GRASSED AREA DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE REGRADED AND SEEDDED AS SPECIFIED.
24. THE CONTRACTOR SHALL GPS LOCATE STRUCTURES UPON INSTALLATION. AN ELECTRONIC LIST OF GPS DATA SHALL BE SUBMITTED ON A MONTHLY BASIS TO ENGINEER AND CITY OF WALTHAM - GIS ADMINISTRATOR (781-314-3006).
25. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHERS.
26. WATER SERVICE SHALL BE MAINTAINED TO ALL CUSTOMERS THROUGHOUT THE CONSTRUCTION PERIOD EXCEPT DURING SCHEDULED SHUTDOWNS AND DURING THE CHANGEOVER OF A CUSTOMER'S SERVICE. CUSTOMERS THAT ARE TO BE CHANGED OVER SHALL BE GIVEN 24 HOURS NOTICE PRIOR TO SHUT OFF.
27. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF ALL NEW WATER LINES. LAYOUT SHALL BE REVIEWED AND ACCEPTED BY THE OWNER AND THE ENGINEER. THE NEW WATER MAINS MUST BE LOCATED WITHIN THE RIGHT-OF-WAY OR EASEMENTS SHOWN ON THE DRAWINGS.
28. NEW HYDRANTS SHALL BE FIELD LOCATED AS SHOWN ON THE DRAWINGS AND APPROVED BY THE WALTHAM FIRE DEPARTMENT PRIOR TO INSTALLATION.
29. ALL BENDS, TEES, REDUCERS, HYDRANTS, AND PLUGS SHALL BE RESTRAINED BY USING CONCRETE THRUST BLOCKS AND PIPE RESTRAINER. ANCHOR TEES SHALL BE USED FOR ALL HYDRANT BRANCHES AND SPRINKLER MAINS.
30. THE CONTRACTOR SHALL VERIFY TO HIS OWN SATISFACTION THAT ALL PERMITS HAVE BEEN OBTAINED TO COMPLETE SPECIFIED WORK.
31. THE CONTRACTOR SHALL REPAIR ALL PAVEMENT DISTURBED BY THE CONSTRUCTION WORK. THE TRENCH PATCHING SHALL BE PERFORMED AS EACH SECTION OF THE WORK IS COMPLETED.
32. TRENCHES SHALL NOT BE LEFT OPEN DURING NON-WORKING HOURS. ALL OPEN PIPES SHALL BE SECURED WITH A WATER TIGHT PLUG WHEN THE PIPE IS TEMPORARILY BACKFILLED AND WHEN PIPE LAYING IS NOT IN PROCESS.
33. THE USE OF TEMPORARY WATER MAINS AND SERVICES WILL BE REQUIRED FOR THIS PROJECT. CONTINUOUS WATER SERVICE MUST BE MAINTAINED AT ALL TIMES. CONTRACTOR TO PROVIDE TEMPORARY WATER BYPASS AS SHOWN ON THE PLANS. IN GENERAL THE BYPASS SHALL BE INSTALLED ALONG THE CURB LINE OR THE REAR OF THE BITUMINOUS WALKWAY. IT SHALL BE BURIED WHEN CROSSING TRAVELED WAYS AND RAMPED WHEN CROSSING DRIVEWAYS. ALL EXISTING HOMES TO BE IMPACTED BY THE WATER MAIN REPLACEMENT SHALL BE PROVIDED A TEMPORARY SERVICE OFF THE WATER BYPASS. ALL HYDRANT CONNECTIONS SHALL MAINTAIN THE SAME NUMBER AND SIZE OF NOZZLES. TEMPORARY WATER BYPASS MATERIALS SHALL MEET AWWA STANDARDS.
34. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL BENDS, FITTINGS, AND ANY AND ALL APPURTENANCES NECESSARY FOR THE COMPLETION OF THE WORK AS SHOWN HEREIN. NOT ALL BENDS AND FITTINGS REQUIRED ARE SHOWN OR CALLED OUT ON THE DRAWINGS.
35. 2-INCHES OF RIGID INSULATION SHALL BE PROVIDED BETWEEN STORM DRAINAGE PIPES AND THE WATER MAIN WHERE NOTED ON THE DRAWINGS.
36. NEW WATER MAINS SHALL BE PRESSURE TESTED AND CHLORINATED IN ACCORDANCE WITH THE SPECIFICATIONS AND APPLICABLE AWWA STANDARDS.
37. THE CONTRACTOR SHALL NOT OPERATE ANY HYDRANTS, VALVES, CURB STOPS OR CORPORATIONS NOR SHALL THEY DRAW ANY WATER FROM THE SYSTEM, WITHOUT SPECIFIC APPROVAL OF THE OWNER.
38. BY-PASS PIPING IS REQUIRED FOR THIS PROJECT. REFER TO THE CONTRACT SPECIFICATIONS FOR DETAILS.

TRAFFIC CONTROL NOTES

- 1. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING TRAFFIC FLOW AT ALL TIMES UNLESS OTHERWISE APPROVED. THE CONTRACTOR IS REQUIRED TO SUBMIT A TRAFFIC CONTROL PLAN TO THE OWNER AND ENGINEER PRIOR TO COMMENCING CONSTRUCTION. THE POLICE DEPARTMENT AND FIRE DEPARTMENT ARE TO BE CONSULTED AT LEAST 48 HOURS IN ADVANCE OF ANY PROPOSED STREET CLOSING OR DETOUR.
2. CONTRACTOR SHALL INSTALL AND MAINTAIN PERMANENT AND TEMPORARY TRAFFIC CONTROL DEVICES AS NECESSARY AND IN A MANNER CONSISTENT WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.).

CONSTRUCTION SEQUENCING NOTES - CEDAR AND OAK ST

THE FOLLOWING IS A RECOMMENDED SEQUENCE OF CONSTRUCTION FOR THE INTERSECTION OF CEDAR AND OAK STREET. CONTRACTOR IS REQUIRED TO SUBMIT A DETAILED SEQUENCE OF CONSTRUCTION PLAN FOR APPROVAL PRIOR TO WORK COMMENCING:

- 1. INSTALL AND TEST ALL TEMPORARY BY-PASS PIPING FOR OAK STREET (CEDAR TO MOORE).
2. ON OAK ST: AT THE INTERSECTION OF CEDAR ST; CLOSE THE EXISTING 6" GATE VALVE (WEST OF CEDAR ST) AND THE EXISTING 12" GATE VALVE (EAST OF CEDAR ST) AND BACKFEED THE WEST END OF OAK ST FROM NEWTON. REFER TO SHEET C-2/C-4.
3. CONSTRUCT THE NEW WATER MAIN PROPOSED ON OAK STREET BETWEEN CEDAR ST AND MOORE STREET. TEST THIS SECTION OF OAK AND BRING ONLINE (KEEPING NEW 8" GV AT CEDAR ST INTERSECTION CLOSED).
4. TEMPORARY SHUT-DOWN OF EXISTING 12" MAIN ON OAK (WEST OF CEDAR) AND EXISTING 12" MAIN ON CEDAR ST. (NORTH OF OAK).
5. INSTALL NEW 12" GATE VALVES AND FITTINGS IN INTERSECTION. MAINTAIN A MINIMUM OF ONE LANE OF TRAVEL ON CEDAR AND OAK STREETS. CLOSE VALVES AND CHARGE MAINS (NORTH END OF CEDAR ST FED FROM CALVARY AND WEST END OF OAK ST FED FROM NEWTON ST).
6. INSTALL AND TEST TEMPORARY BY-PASS PIPING ON CEDAR STREET (OAK ST TO HIGH ST) BY CONNECTING TO EXISTING HYDRANT ON CEDAR (NORTH OF OAK).
7. COMPLETE THE REMAINING WORK IN THE INTERSECTION OF OAK AND CEDAR (MAINTAINING ONE LANE OF TRAFFIC).
8. CONTINUE WATERMAIN INSTALLATION ON CEDAR ST.

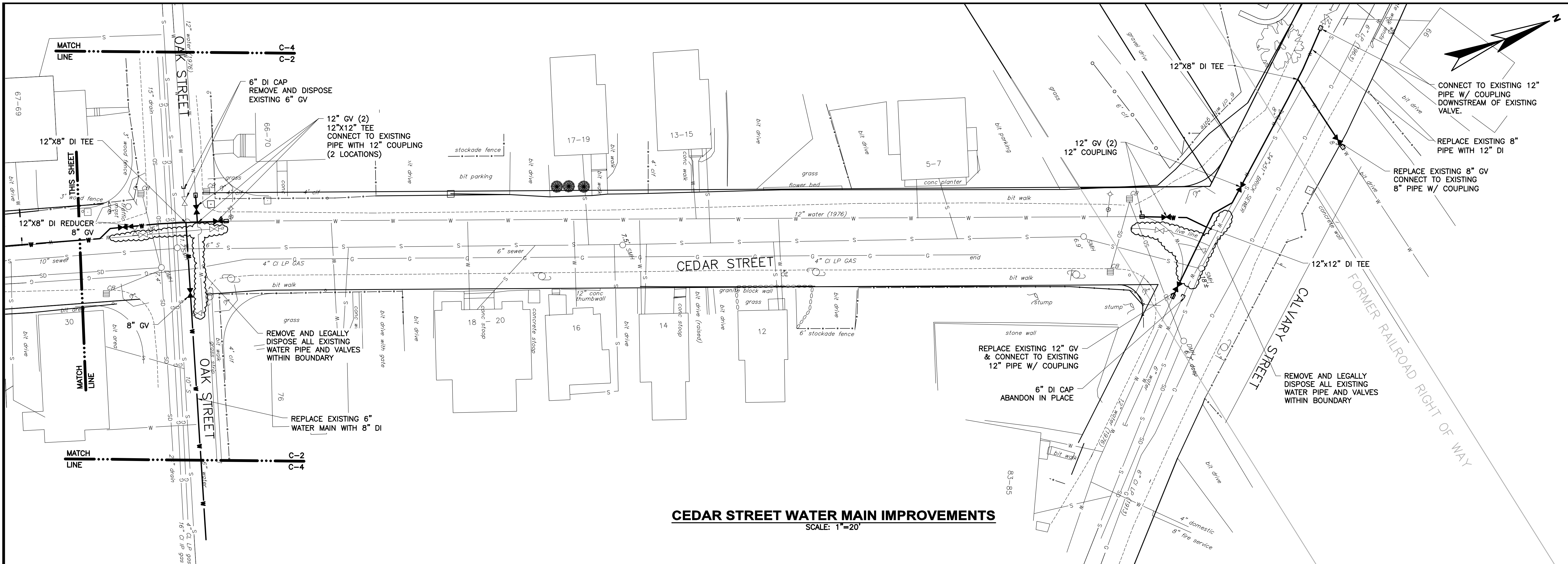
CIVIL ABBREVIATIONS

Table listing abbreviations for various civil engineering terms such as DIA, NO, AC, APP'D, BLDG, CB, CDF, CEN, CFS, CI, CL, CMP, CO, CONC, COR, CY, DEMO, DMH, DI, DR, DWG, EL, EMH, FM, FT, G, GV, HOPE, HYD, ID, IN, INF, INV, LBS, MAX, MH, MIN, MJ, N, NGVD, N/A, NTS, OD, PSF, PSI, PT, PVC, RCP, RD, REQ'D, S, SD, SF, SMH, SQ, STA, T, XFMR, TBM, THK, TOS, TYP, UD, UG, UGE, W/, W, WG.

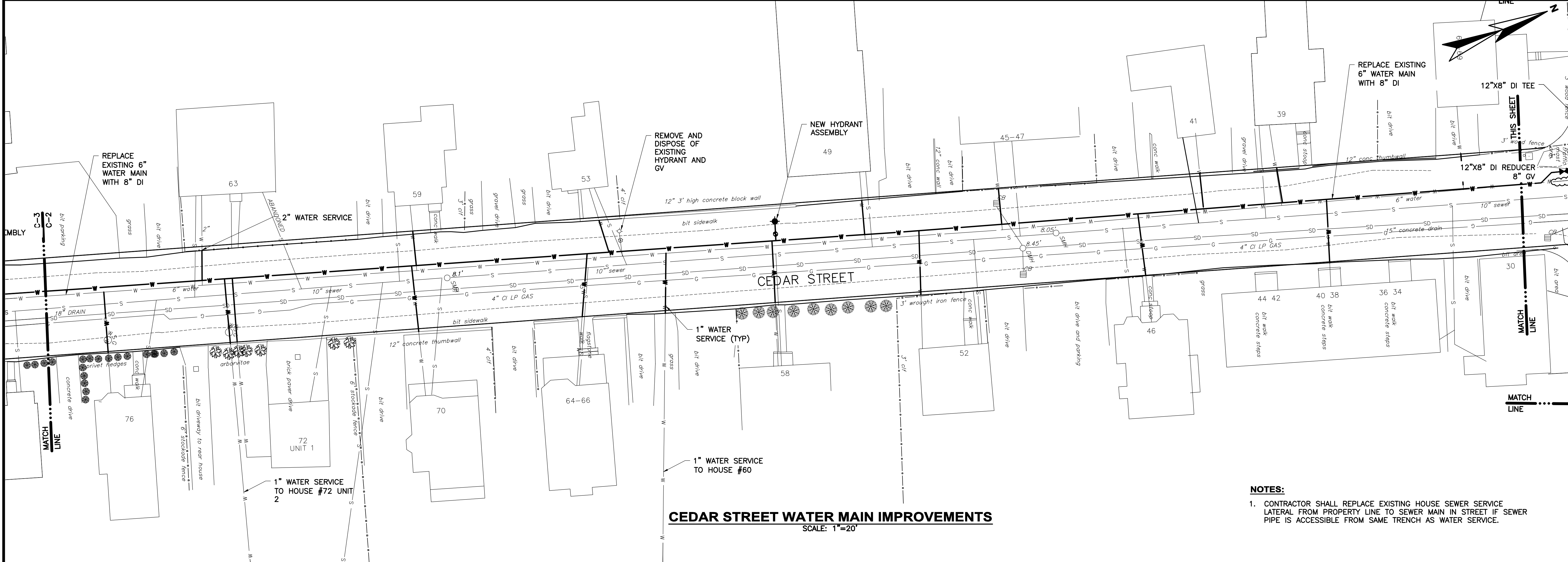
LEGEND

Legend table with columns for EXISTING and PROPOSED symbols and their corresponding descriptions: PROPERTY/ROW LINE, SETBACK LINE, EASEMENT LINE, CENTERLINE, EDGE OF PAVEMENT, CURBING, EDGE OF GRAVEL, EDGE OF CONCRETE, CONTOUR, BUILDING, STONEWALL, TREELINE, CHAIN LINK FENCE, STOCKADE FENCE, BARB WIRE FENCE, RETAINING WALL, GUARDRAIL, SEWER, SEWER FORCE MAIN, GAS, WATER, STORM DRAIN, UNDERDRAIN, CULVERT, UNDERGROUND ELECTRIC, OVERHEAD ELECTRIC, IRON PIPE/REBAR, DRILLHOLE, MONUMENT, SURVEY CONTROL POINT, SPOT ELEVATION, SEWER MANHOLE, DRAINAGE MANHOLE, CATCH BASIN, ELECTRIC MANHOLE, TELEPHONE MANHOLE, SHUTOFF VALVE, WATER SERVICE SHUTOFF, YARD HYDRANT, HYDRANT, UTILITY POLE, UTILITY POLE W/ GUY, UTILITY POLE W/ LIGHT, LIGHT POLE, BOLLARD, FLAGPOLE, CONIFEROUS TREE, DECIDUOUS TREE, SHRUB, EDGE OF WATER, STREAM, EDGE OF WETLANDS, FLOODPLAIN, WETLANDS, DRAINAGE FLOW, DRAINAGE SWALE, PAVEMENT MARKINGS, SIGN, MAILBOX, TEMPORARY BENCH MARK, TEST PIT, TEST BORING, TEST PROBE, MONITORING WELL, LIMIT OF WORK, SILT FENCE, RIPRAP, RAILROAD, MATCHLINE, ROCK OUTCROP.

Project information block including: ISSUED FOR BID, NO, SUBMISSIONS/REVISIONS, DESIGNED BY: RAS, CAD COORD: DHF, CHECKED BY: JEC, DATE: 9-10-14, APPROVED BY: R/W, DATE: 4-11-14, PROJECT NO: 12858A, WRIGHT-PIERCE logo, WALTHAM, MASSACHUSETTS WATER MAIN IMPROVEMENTS CEDAR ST., OAK ST., PLYMPTON ST., AND WILLARD ST., CIVIL GENERAL NOTES, ABBREVIATIONS AND LEGEND, DRAWING C-1.



**CEDAR STREET WATER MAIN IMPROVEMENTS**  
SCALE: 1"=20'



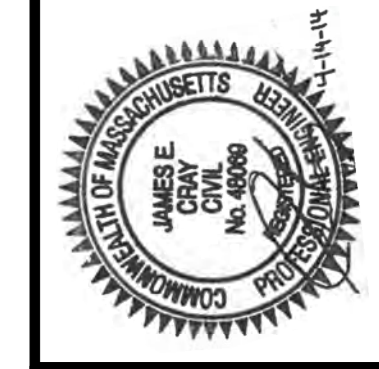
**CEDAR STREET WATER MAIN IMPROVEMENTS**  
SCALE: 1"=20'

**NOTES:**

1. CONTRACTOR SHALL REPLACE EXISTING HOUSE SEWER SERVICE LATERAL FROM PROPERTY LINE TO SEWER MAIN IN STREET IF SEWER PIPE IS ACCESSIBLE FROM SAME TRENCH AS WATER SERVICE.

NO.	ISSUED FOR	DATE
1	ISSUED FOR BID	JEC 4-14

DESIGNED BY	RAS
CAD. COORD.	DHF
CALC. DATE/JEC	DHF/JEC
CHECKED BY	JEC
DATE	5-10-14
APPROVED BY	RJM
DATE	4-11-14
PROJECT NO.	12858A

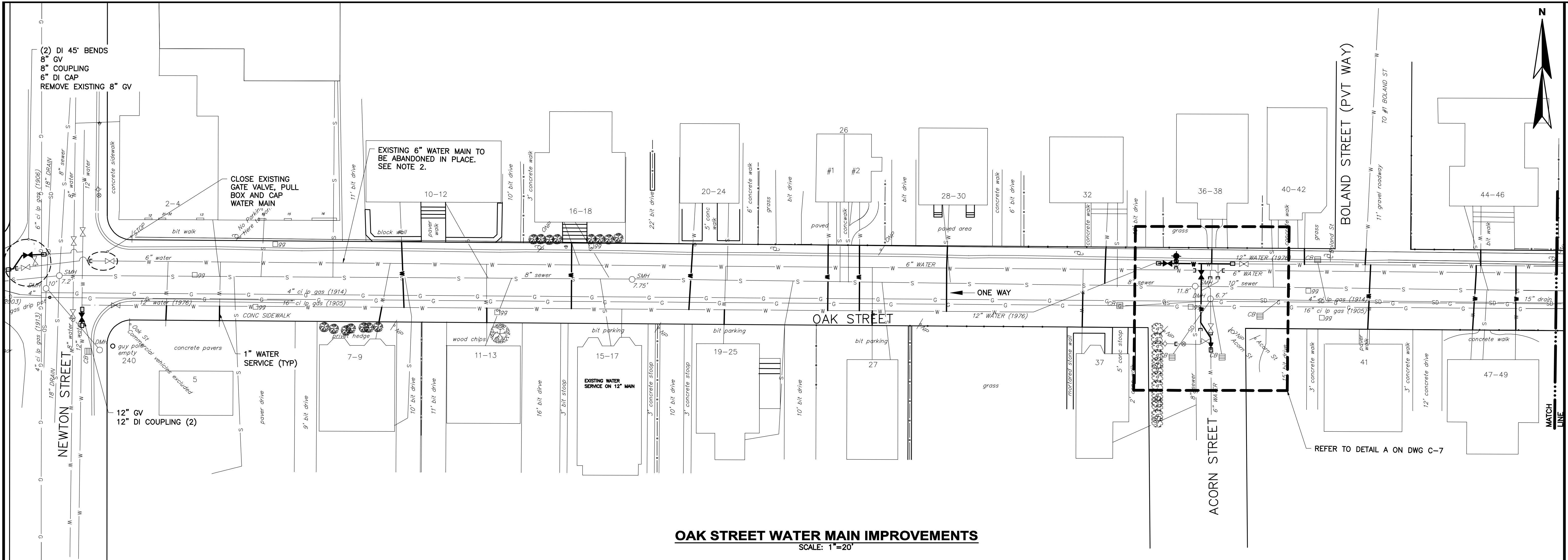


NO.	ISSUED FOR	DATE
1	ISSUED FOR BID	JEC 4-14

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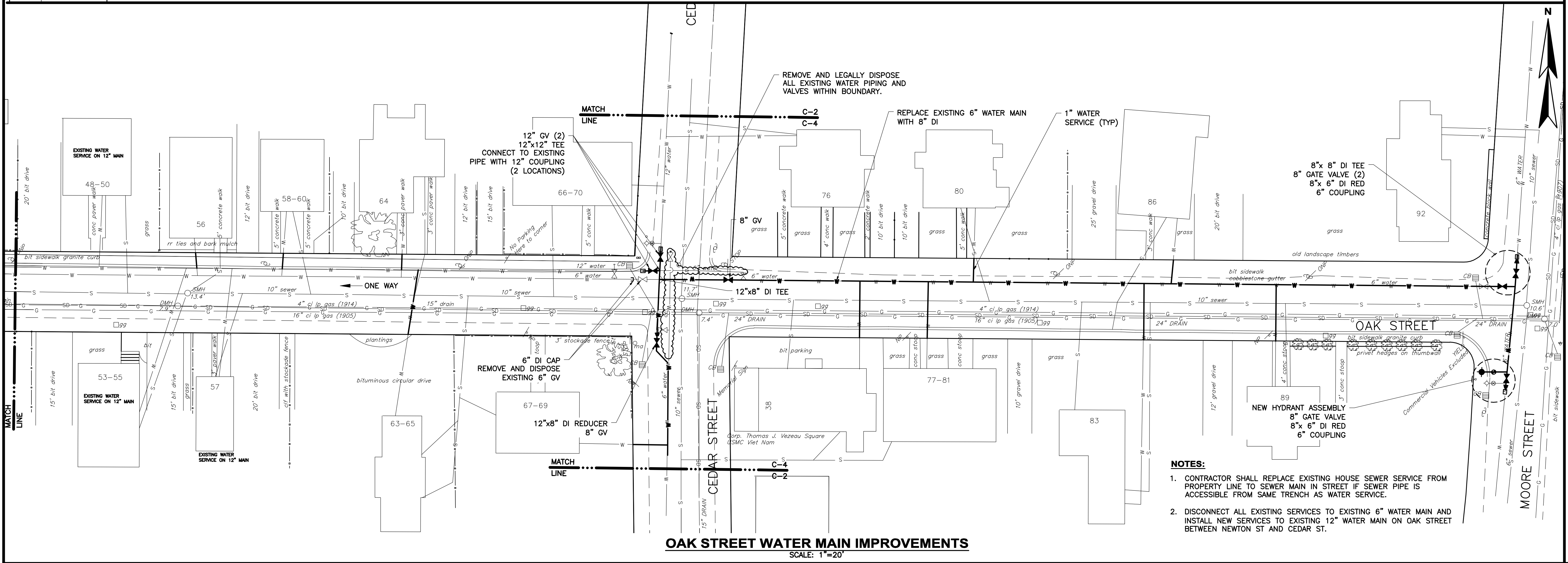
WALTHAM, MASSACHUSETTS  
WATER MAIN IMPROVEMENTS  
CEDAR ST., OAK ST., PLYMPTON ST.,  
AND WILLARD ST.  
CEDAR STREET WATER MAIN | PLAN  
DRAWING  
C-2





**OAK STREET WATER MAIN IMPROVEMENTS**

SCALE: 1"=20'



**OAK STREET WATER MAIN IMPROVEMENTS**

SCALE: 1"=20'

**NOTES:**

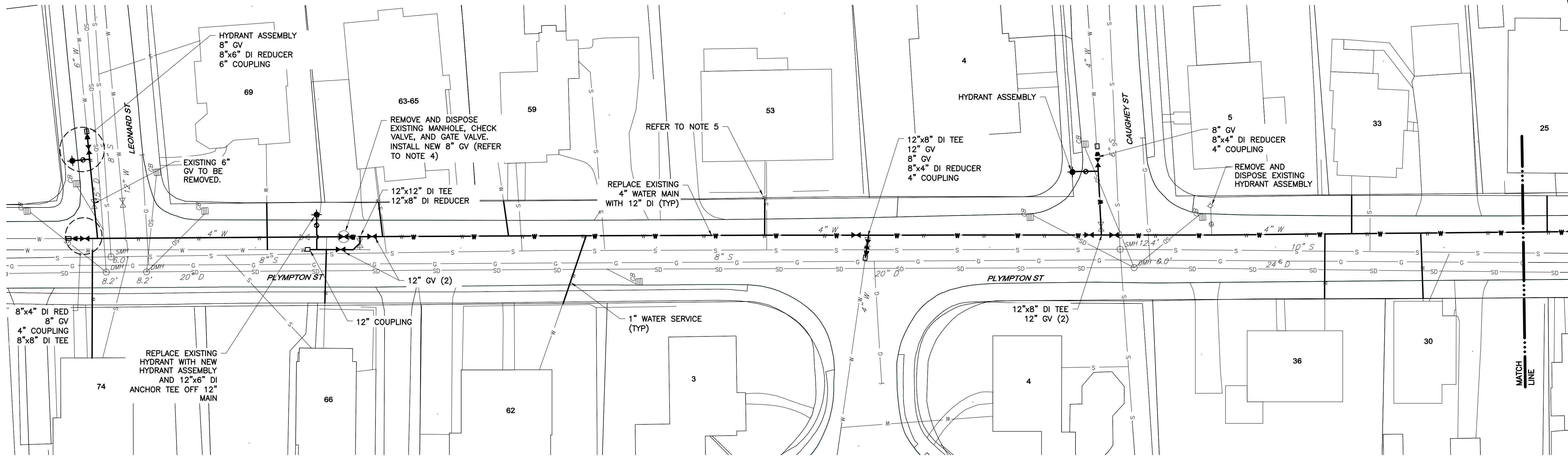
- CONTRACTOR SHALL REPLACE EXISTING HOUSE SEWER SERVICE FROM PROPERTY LINE TO SEWER MAIN IN STREET IF SEWER PIPE IS ACCESSIBLE FROM SAME TRENCH AS WATER SERVICE.
- DISCONNECT ALL EXISTING SERVICES TO EXISTING 6" WATER MAIN AND INSTALL NEW SERVICES TO EXISTING 12" WATER MAIN ON OAK STREET BETWEEN NEWTON ST AND CEDAR ST.

DESIGNED BY	RAS
CAD. COORD.	DHF
CALC. DATE	10-14
CHECKED BY	JEC
DATE	5-10-14
APPROVED BY	RJM
DATE	4-11-14
PROJECT NO.	12858A
ISSUED FOR	BID
NO.	1
DATE	4-14
SUBMISSIONS/REVISIONS	

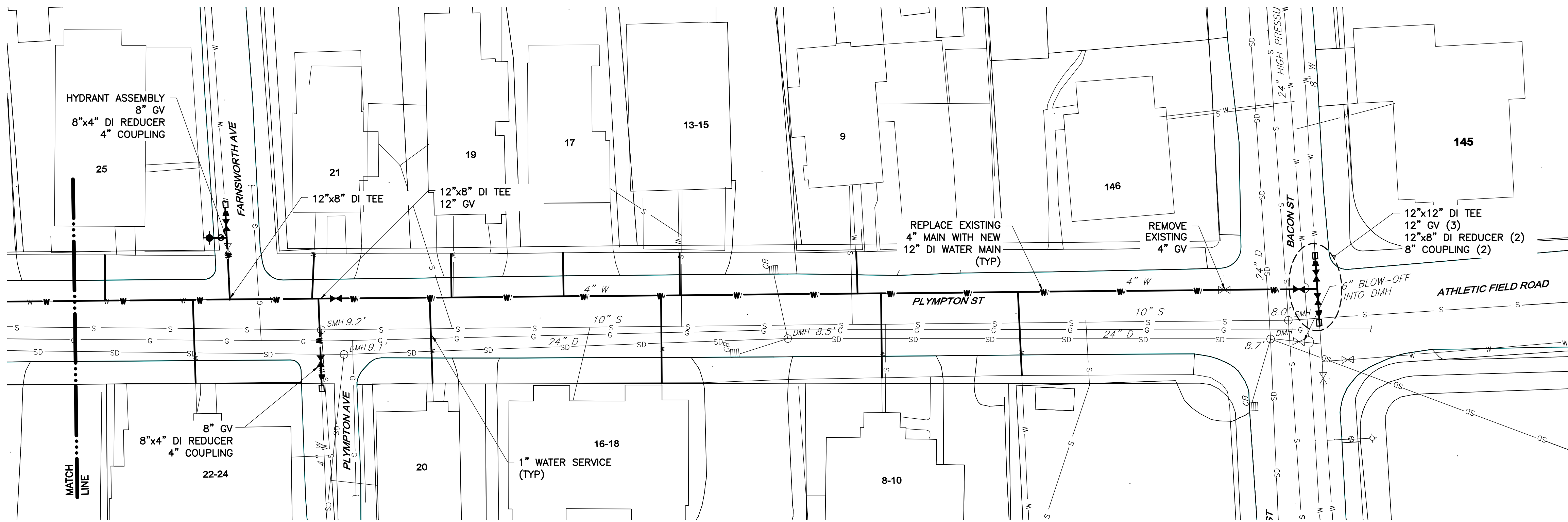
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WALTHAM, MASSACHUSETTS  
WATER MAIN IMPROVEMENTS  
CEDAR ST., OAK ST., PLYMPTON ST.,  
AND WILLARD ST.  
OAK STREET WATER MAIN PLAN

DRAWING  
C-4



**PLYMPTON STREET WATER MAIN IMPROVEMENTS**  
SCALE: 1"=20'



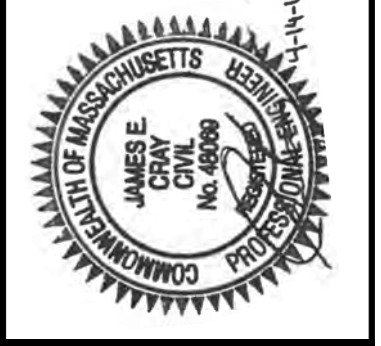
**PLYMPTON STREET WATER MAIN IMPROVEMENTS**  
SCALE: 1"=20'

**NOTES:**

1. NEW 8" GATE VALVE TO BE INSTALLED AT EXISTING WATER MANHOLE LOCATION SHALL REMAIN CLOSED IN ORDER TO ISOLATE PRESSURE ZONE BOUNDARIES.
2. CONTRACTOR SHALL REPLACE EXISTING HOUSE SEWER SERVICE FROM PROPERTY LINE TO SEWER MAIN IN STREET IF PIPE IS ACCESSIBLE FROM SAME TRENCH AS THE WATER SERVICE.

NO.	ISSUED FOR	DATE
1	ISSUED FOR BID	JEC 4-14

DESIGNED BY: RAS	DATE: 4-11-14
CAD. COORD.: DHF	PROJECT NO.: 12858A
CALC. DATE: JEC	
CHECKED: 10-14	
DATE: 5-10-14	
APPROVED BY: R/W	

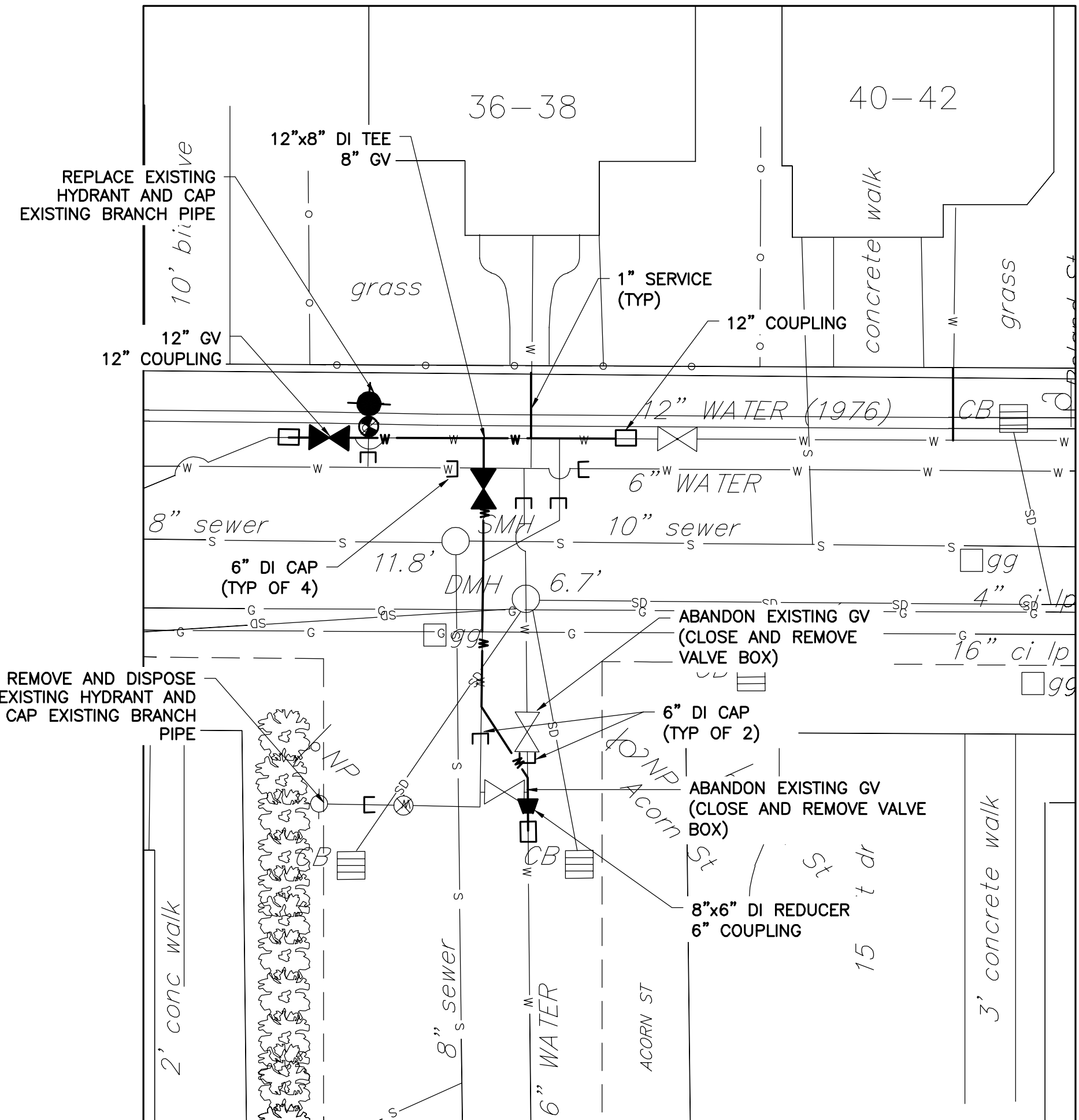


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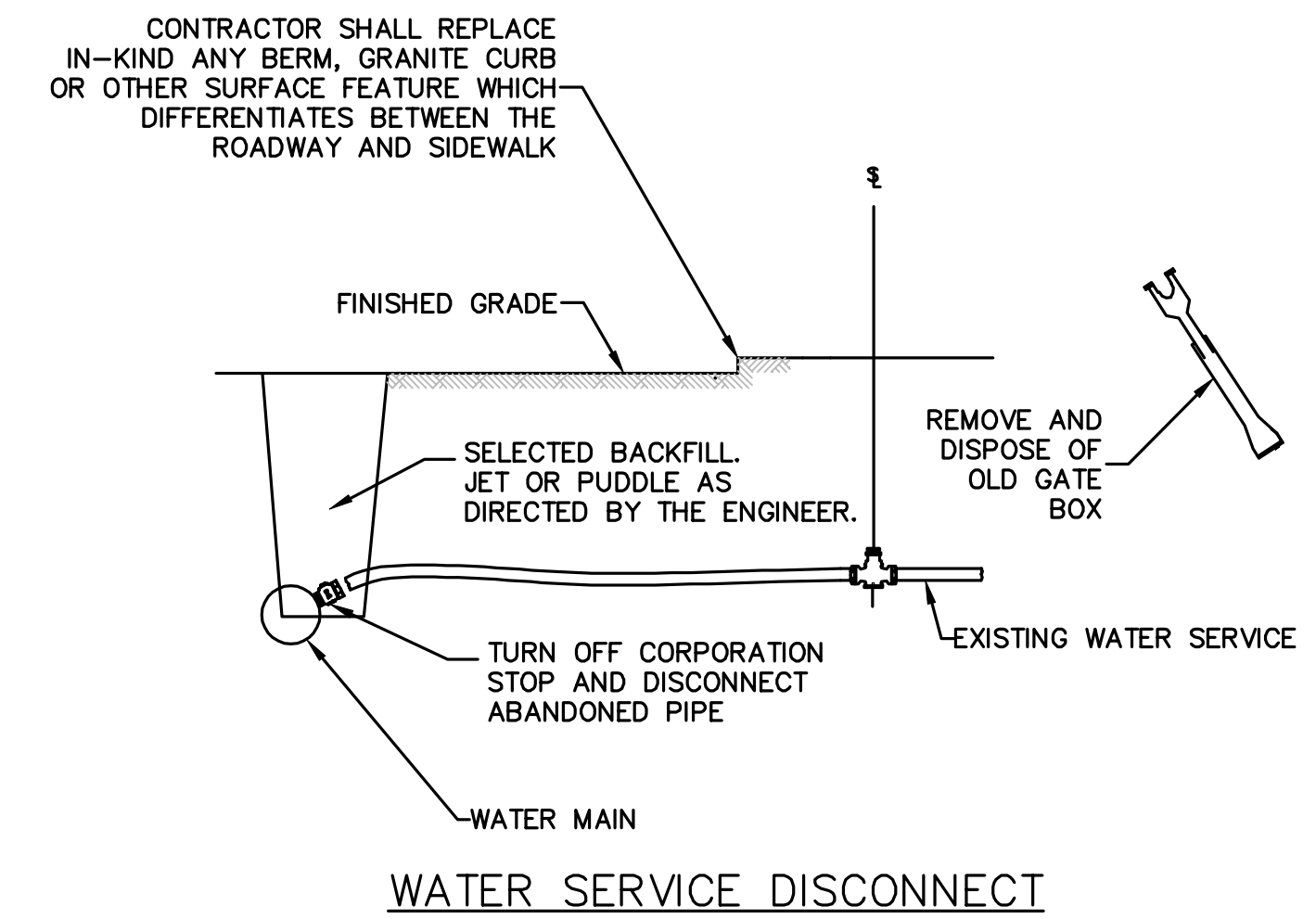
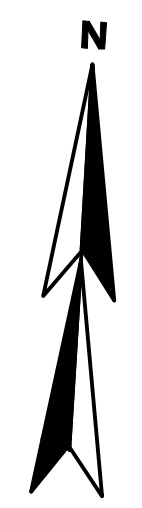
WALTHAM, MASSACHUSETTS  
WATER MAIN IMPROVEMENTS  
CEDAR ST; OAK ST; PLYMPTON ST,  
AND WILLARD ST  
PLYMPTON STREET WATER MAIN PLAN



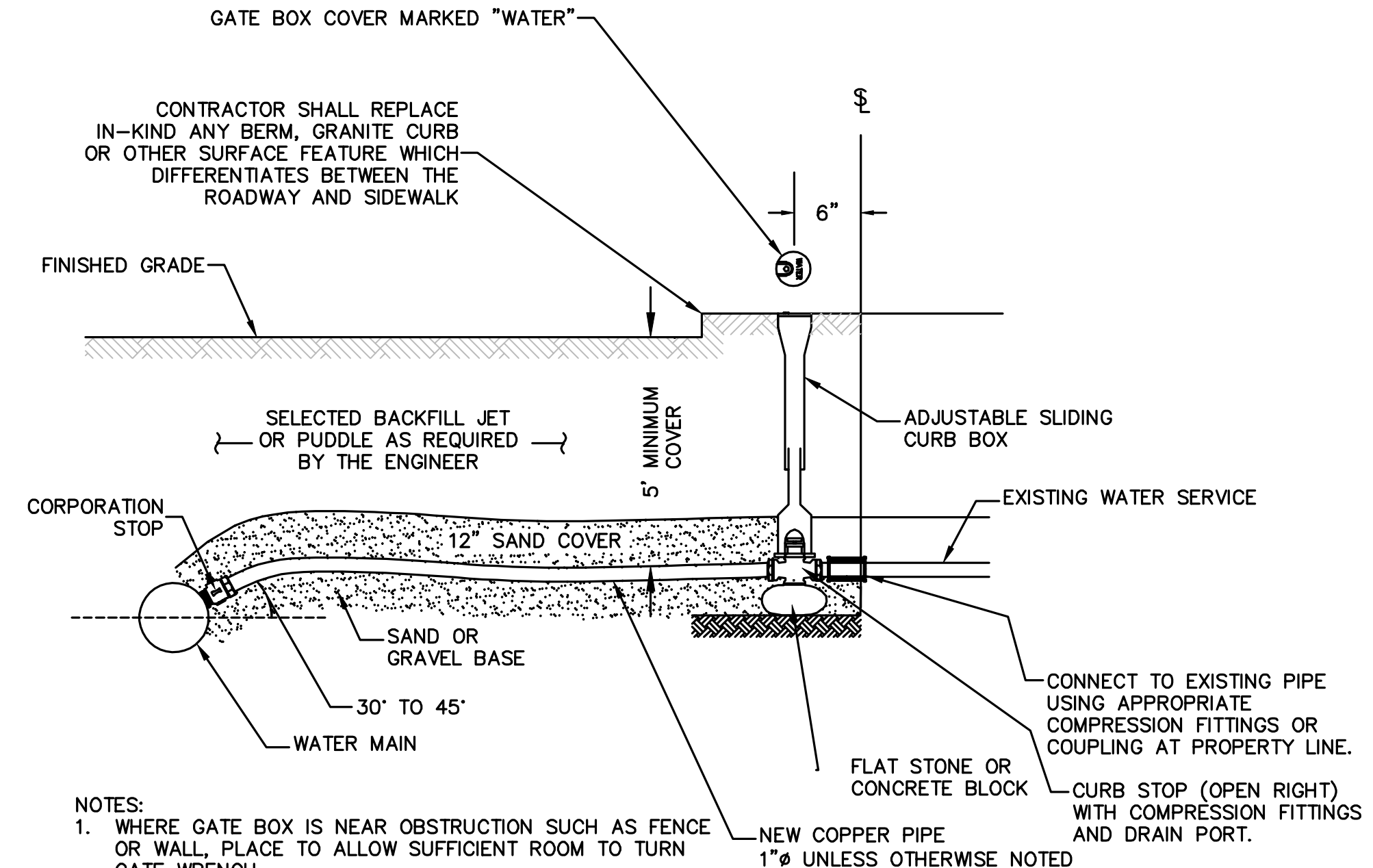




**DETAIL A**  
SCALE: 1" = 10'

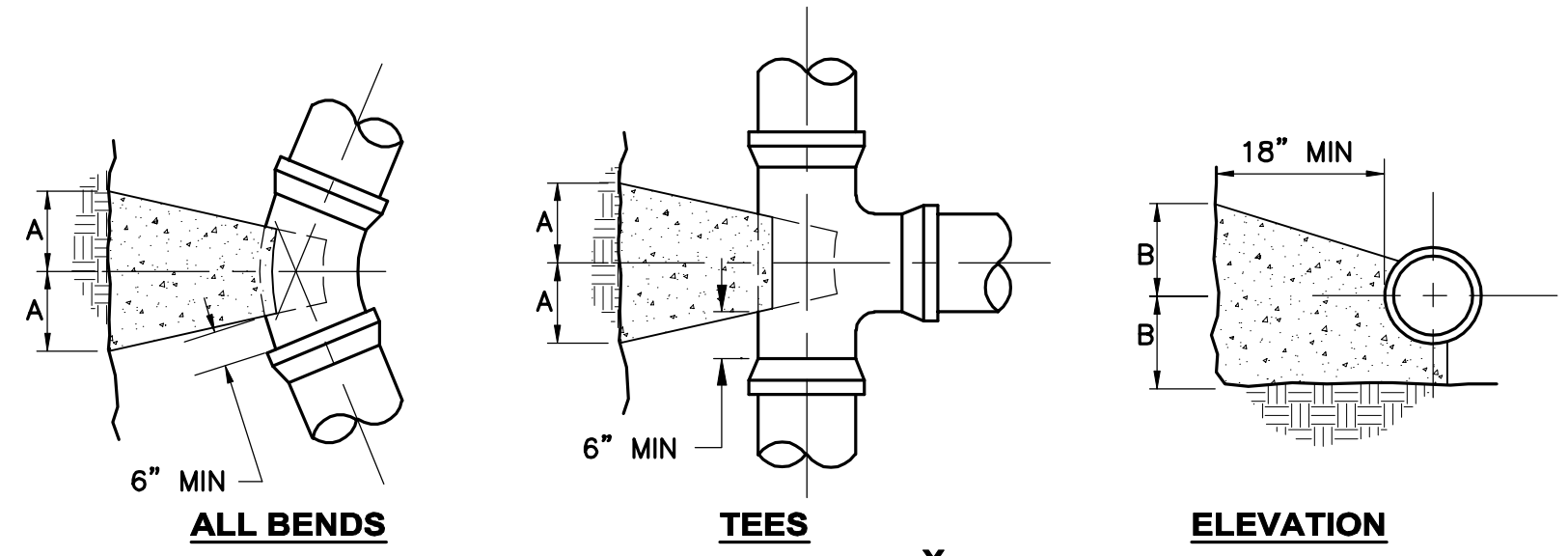


**WATER SERVICE DISCONNECT**

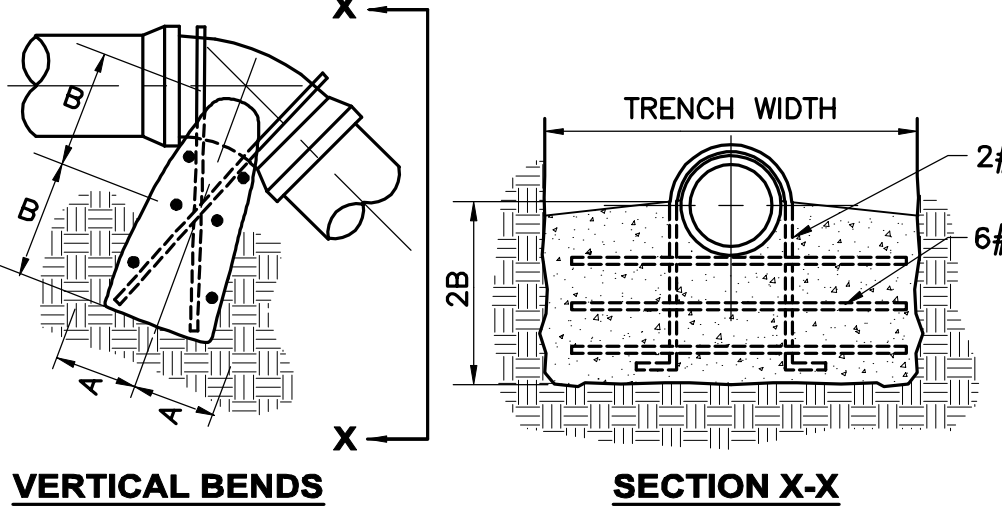


**WATER SERVICE DETAIL**

- NOTES:  
1. WHERE GATE BOX IS NEAR OBSTRUCTION SUCH AS FENCE OR WALL, PLACE TO ALLOW SUFFICIENT ROOM TO TURN GATE WRENCH.  
2. REMOVE AND DISPOSE OF ABANDONED PIPE AND GATE BOX.

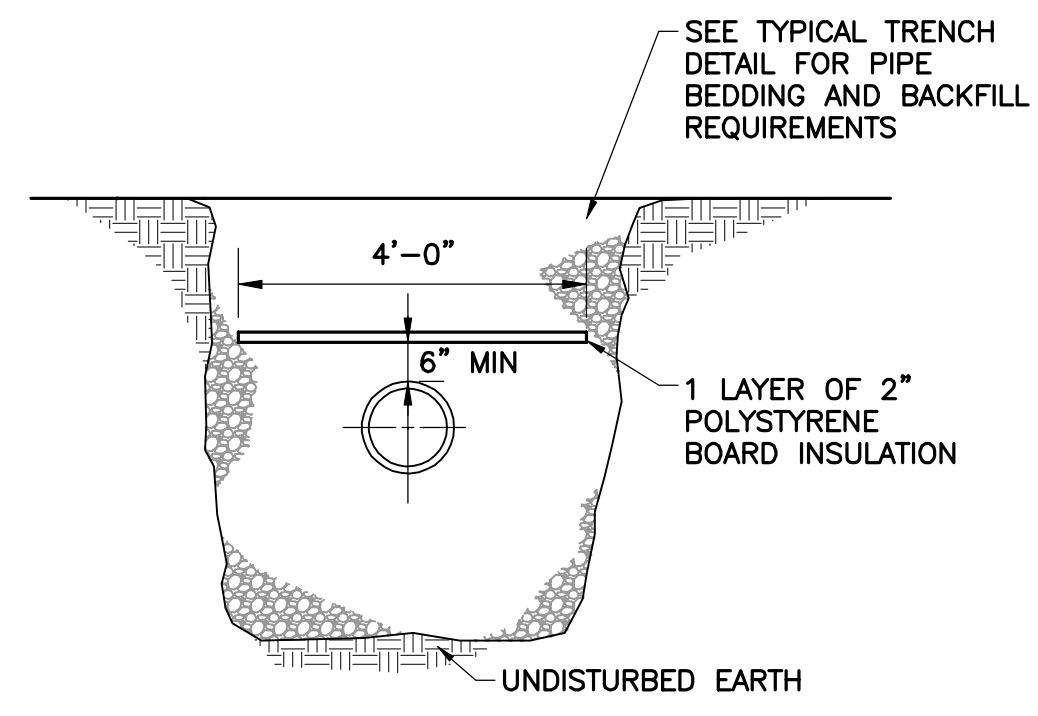


- NOTES**  
1. THRUST BLOCK SIZES SHOWN ARE BASED ON A SOIL BEARING CAPACITY OF 2000 PSF AND TEST PRESSURES OF 180 PSI.  
2. POLYETHYLENE (6 mil) SHALL BE PLACED AROUND FITTINGS PRIOR TO CONCRETE PLACEMENT



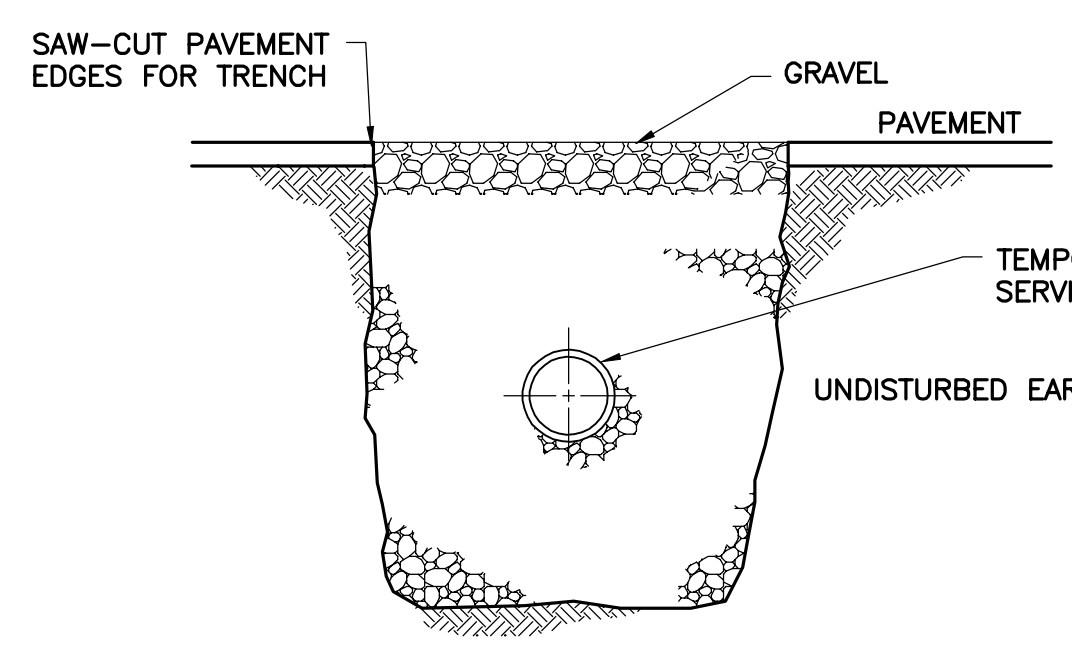
PIPE SIZE	90° BEND		45° BEND		22 1/2° BEND		11 1/4° BEND		TEE		VERTICAL BEND (DOWN)	
	A	B	A	B	A	B	A	B	A	B	A	B
6"	15"	12"	12"	9"	9"	6"	6"	6"	12"	12"	24"	21"
8"	20"	15"	14"	12"	9"	9"	9"	6"	18"	12"	33"	24"
10"	21"	21"	18"	15"	15"	9"	9"	9"	20"	18"	40"	27"
12"	27"	24"	23"	15"	15"	12"	12"	9"	25"	18"	48"	30"
16"	37"	30"	30"	21"	21"	15"	13"	12"	32"	24"	57"	36"

**WATER MAIN THRUST BLOCK**  
SCALE: NTS

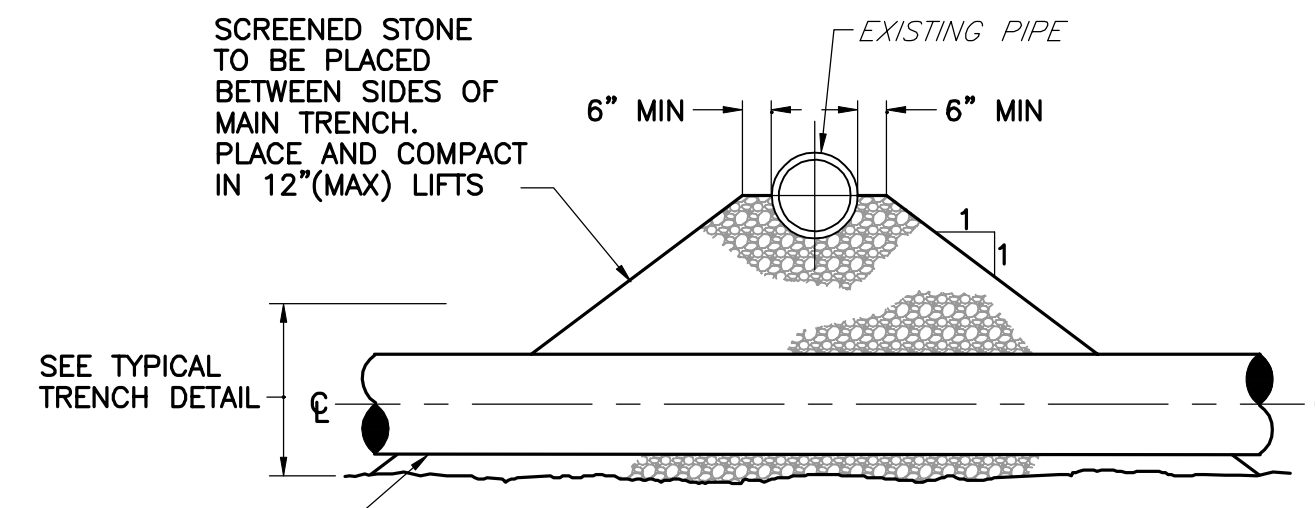


**TRENCH PIPE INSULATION**  
SCALE: NTS

NOTE: TRENCH PIPE INSULATION TO BE USED WHERE DEPTH OF COVER IS LESS THAN \*\* FEET OR AS DIRECTED BY THE ENGINEER

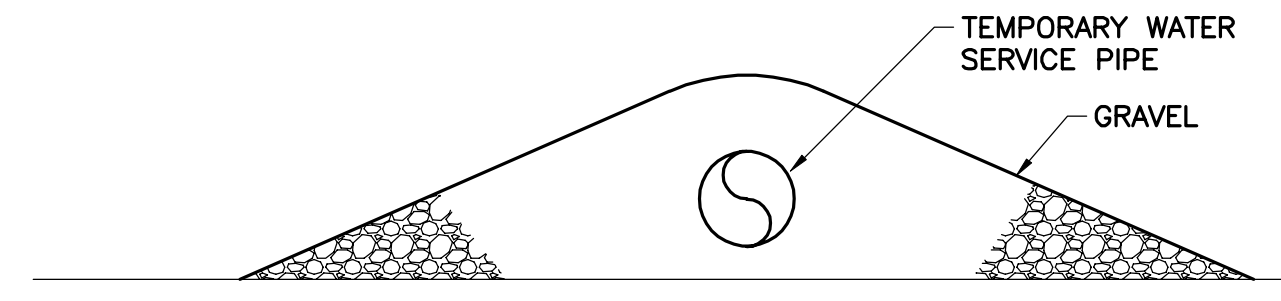


**TEMPORARY WATER SERVICE PIPE TRENCH DETAIL**  
NTS

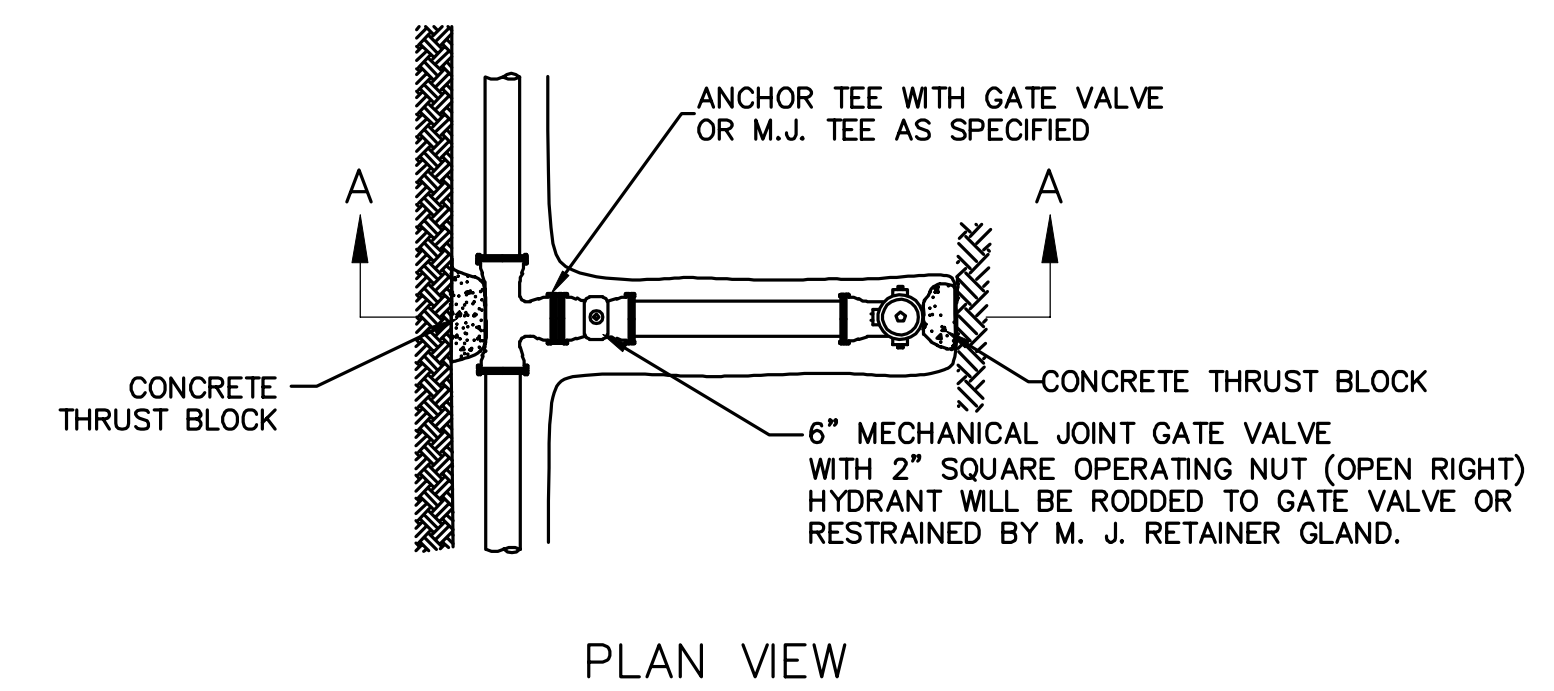


**PIPE CROSSING**  
SCALE: "NTS"

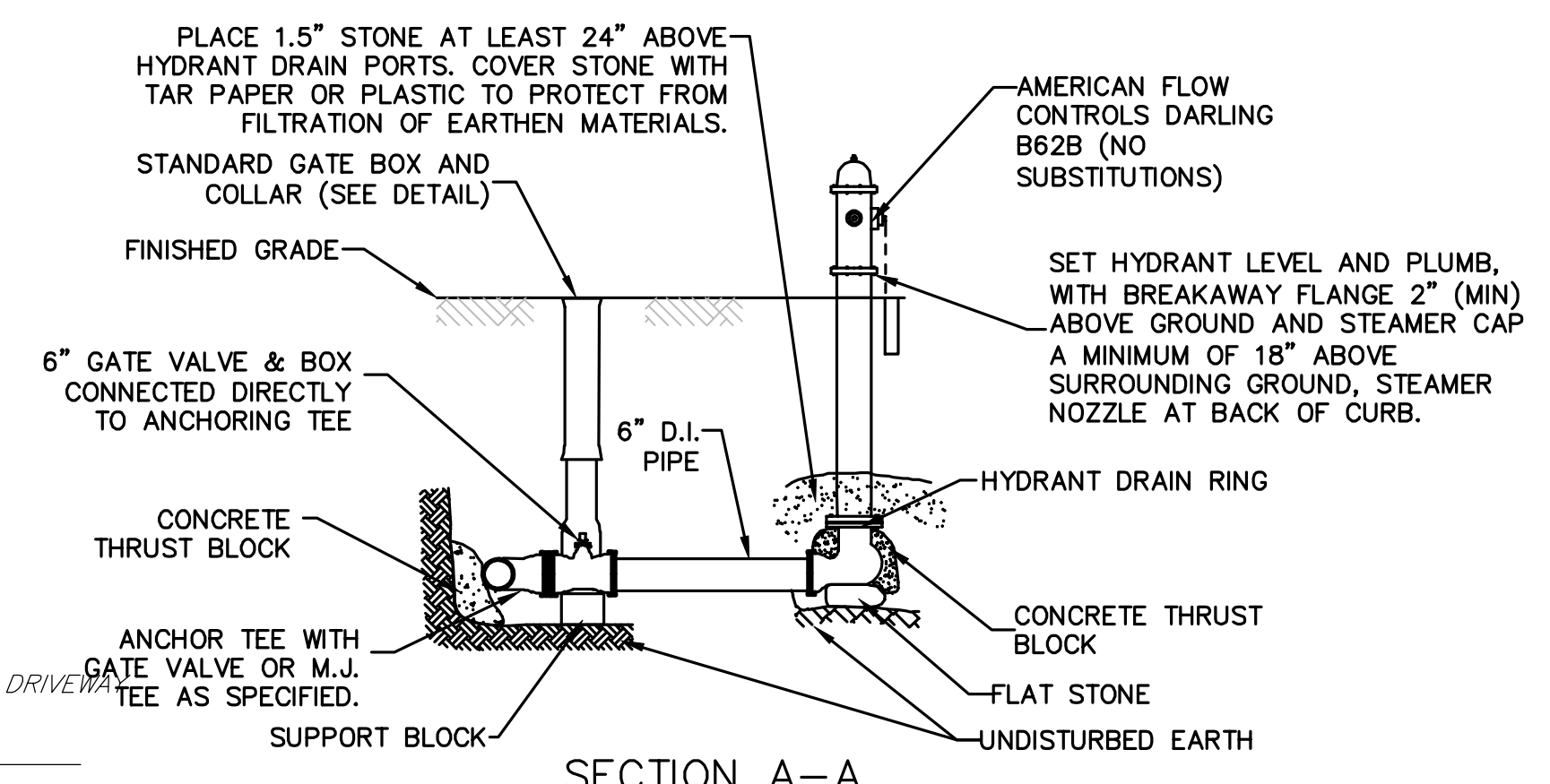
NOTE: JOINTS ON EACH PIPE TO BE AS FAR FROM INTERSECTION AS POSSIBLE



**TEMPORARY WATER SERVICE PIPE OVER DRIVEWAY DETAIL**  
NTS



**PLAN VIEW**



**SECTION A-A**

- NOTES:  
1. PROVIDE HYDRANT AND VALVE JOINTS WITH APPROVED MECHANICAL JOINTS.  
2. SUPPORT BLOCKS TO BE PRESSURE TREATED WOOD OR CONCRETE MASONRY BLOCK.  
3. ALL VALVES OPEN LEFT.

**HYDRANT DETAILS**

NO.	ISSUED FOR	DATE
1	FOR BID	4-14
2		
3		
4		

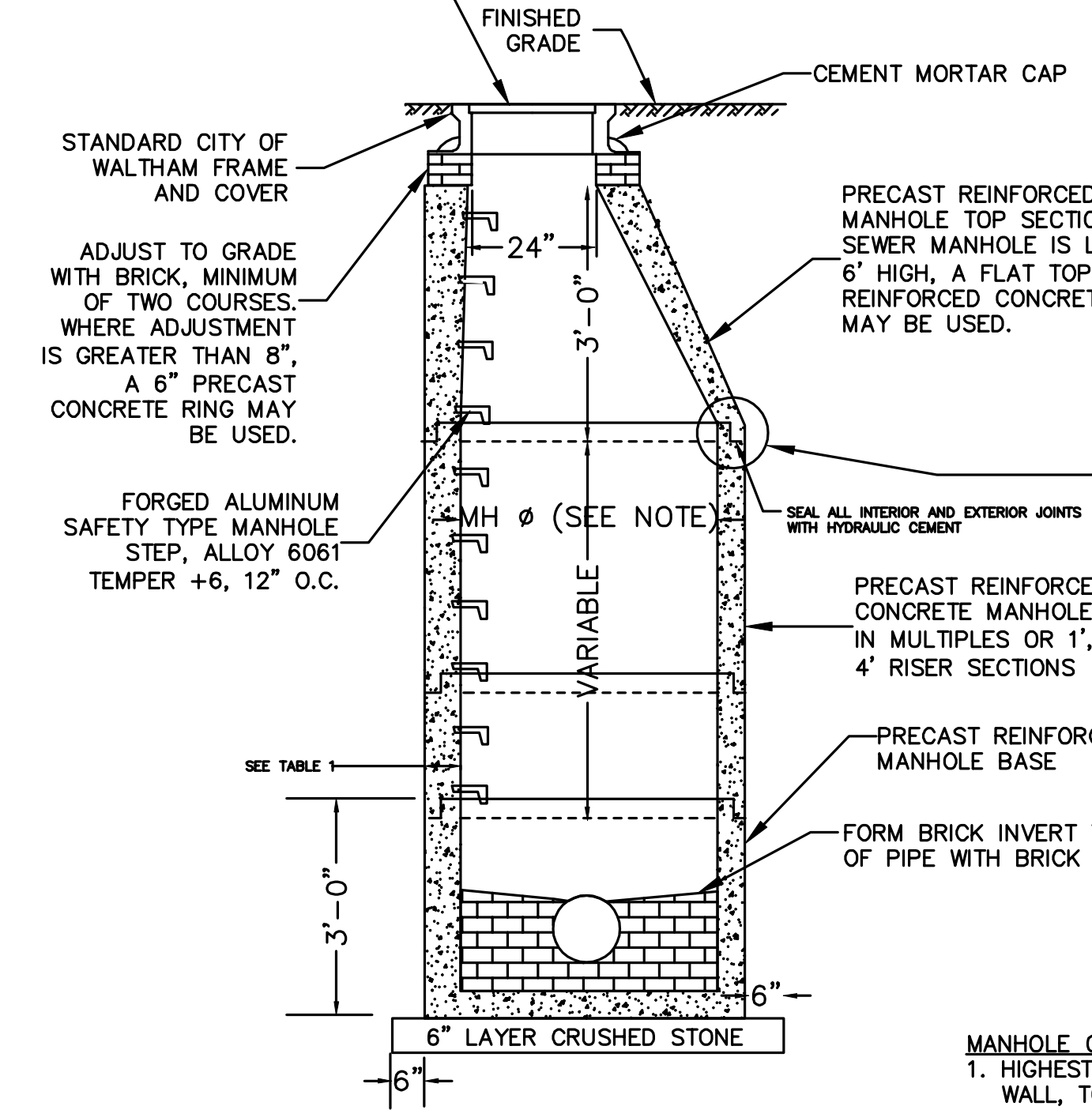
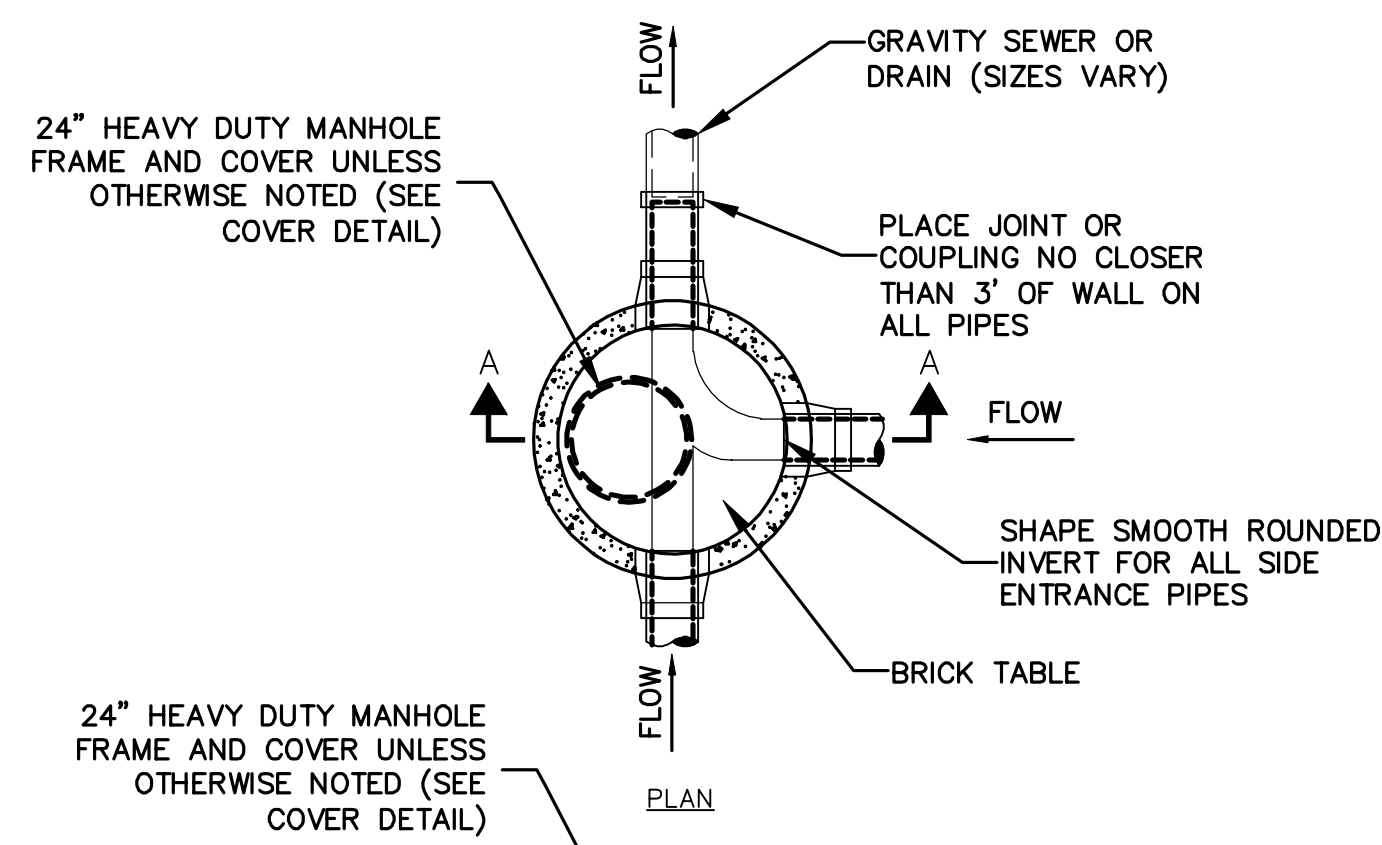
DESIGNED BY: RAS  
CADD: DJF/JEC  
CHECKED BY: JEC  
DATE: 3-10-14  
APPROVED BY: RWJ  
DATE: 4-11-14  
PROJECT NO: 12858A

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WALTHAM, MASSACHUSETTS  
WATER MAIN IMPROVEMENTS  
CEDAR ST., OAK ST., PLYMPTON ST.,  
AND WILLARD ST.

DETAILS I

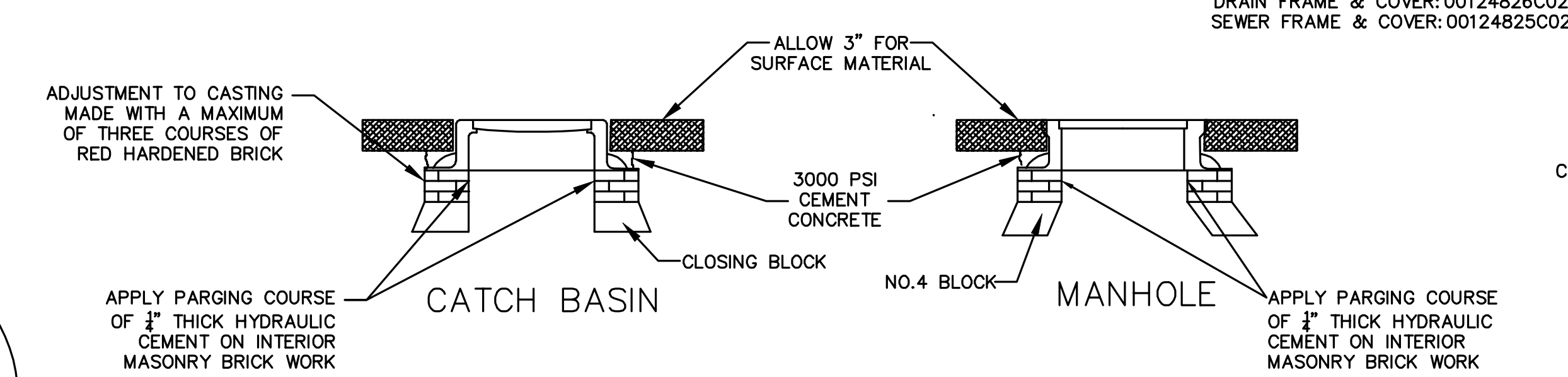
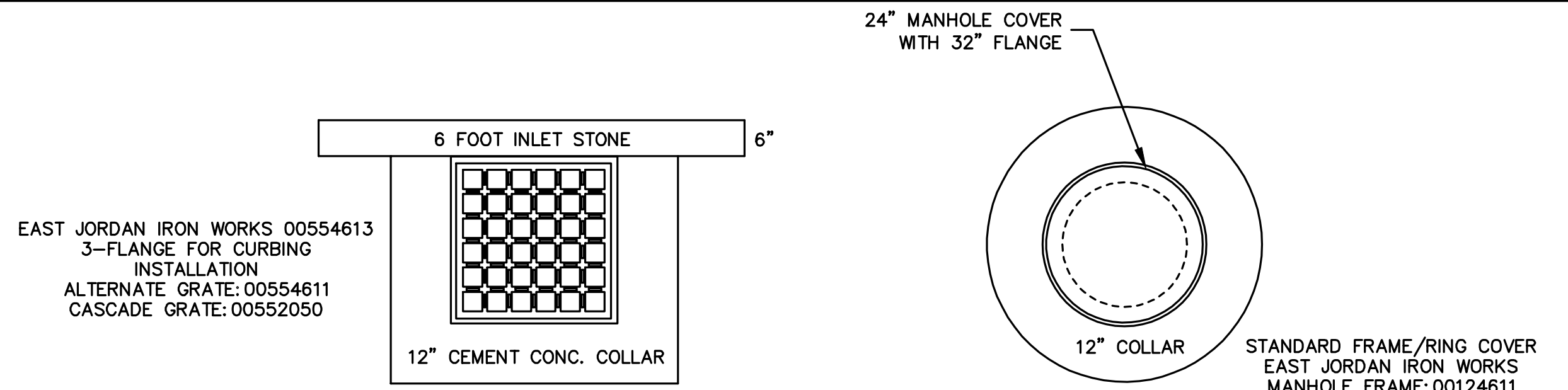
**DRAWING**  
C-7



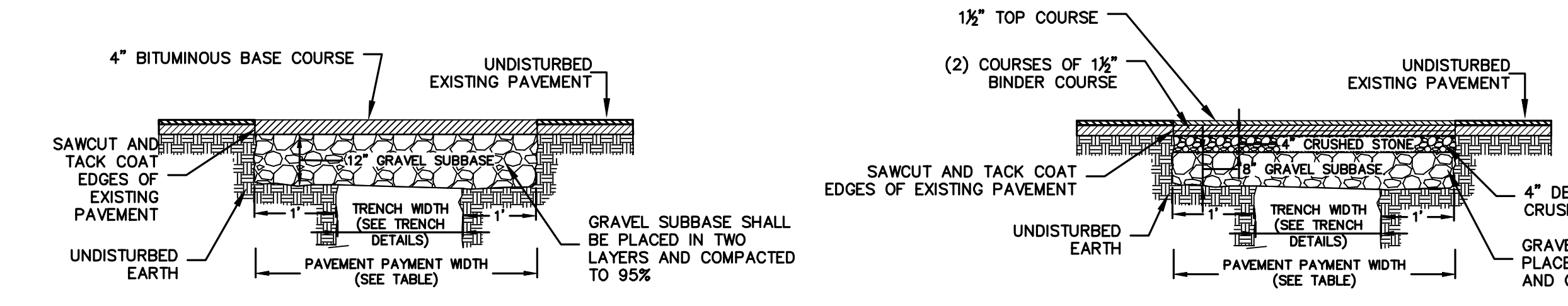
SECTION A-A  
STANDARD MUNICIPAL MANHOLE

MANHOLE GENERAL NOTES:

- HIGHEST POINT OF BRICK TABLE AT MANHOLE WALL, TO BE AT ELEV. OF CROWN OF PIPE. TABLE TO SLOPE AT 8.3%.
- SEWER OR DRAIN MANHOLE DIAMETER SHALL BE 4', 5', 6', 8' OR 10' AS SHOWN ON PLAN/PROFILE VIEWS.
- DESIGN PRECAST SECTIONS WITH FRAME AND COVER FOR AASHTO H20 LOADINGS. UNLESS OTHERWISE NOTED.
- PRECAST MANHOLES SHALL BE PRE-ORDERED WITH PENETRATIONS AT ELEVATIONS INDICATED ON CONTRACT DRAWINGS.



CEMENT CONCRETE COLLARS FOR MANHOLES AND CATCH BASINS



TRENCH PAY LIMIT TABLE FOR TEMPORARY PAVEMENT

PIPE SIZE (I.D.)	DEPTH TO PIPE INVERT				PAY WIDTH
	0 - 8'	OVER 8' - 12'	OVER 12' - 16'	OVER 16' - 20'	
0" - 24"	6'-6"	9'-6"	12'-6"	15'-6"	HIGHER
OVER 24"	O.D. + 4'-0"	O.D. + 7'-0"	O.D. + 10'-0"	O.D. + 13'-0"	

I.D. = INSIDE DIMENSION  
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'-0" OF PIPE INVERT DEPTH OVER 20', ADD 3'-0" TO WIDTH LIMITS

TEMPORARY PAVEMENT DEPTH SHALL BE 3-IN.

TRENCH PAY LIMIT TABLE FOR PERMANENT PAVEMENT

PIPE SIZE (I.D.)	DEPTH TO PIPE INVERT				PAY WIDTH
	0 - 8'	OVER 8' - 12'	OVER 12' - 16'	OVER 16' - 20'	
0" - 24"	8'-6"	11'-6"	14'-6"	17'-6"	HIGHER
OVER 24"	O.D. + 6'-0"	O.D. + 9'-0"	O.D. + 12'-0"	O.D. + 15'-0"	

I.D. = INSIDE DIMENSION  
O.D. = OUTSIDE DIMENSION

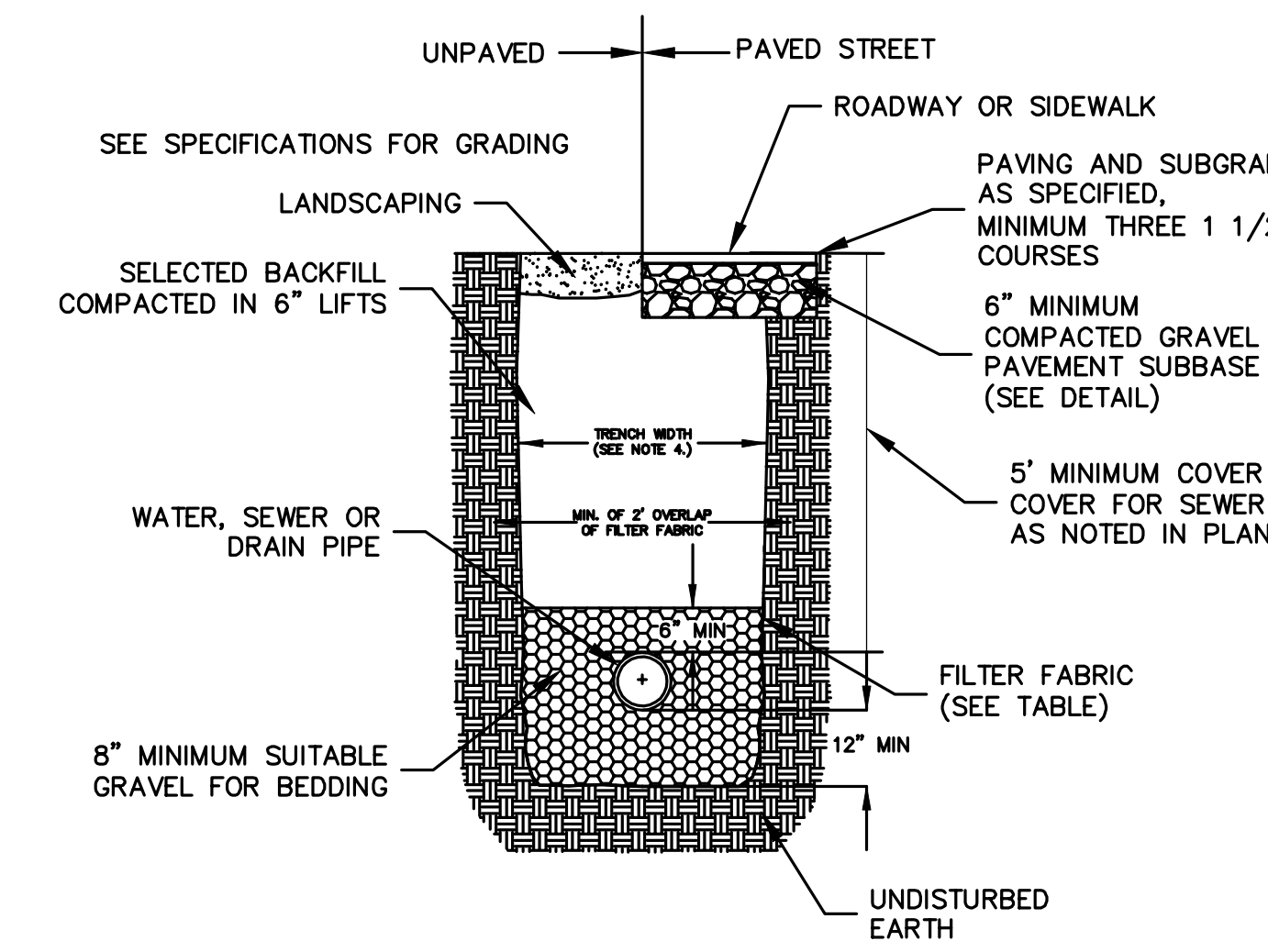
FOR EACH ADDITIONAL 4'-0" OF PIPE INVERT DEPTH OVER 20', ADD 3'-0" TO WIDTH LIMITS

TEMPORARY TRENCH PAVEMENT DETAIL

PERMANENT TRENCH PAVEMENT DETAIL

TEMPORARY AND PERMANENT TRENCH PAVEMENT NOTES:

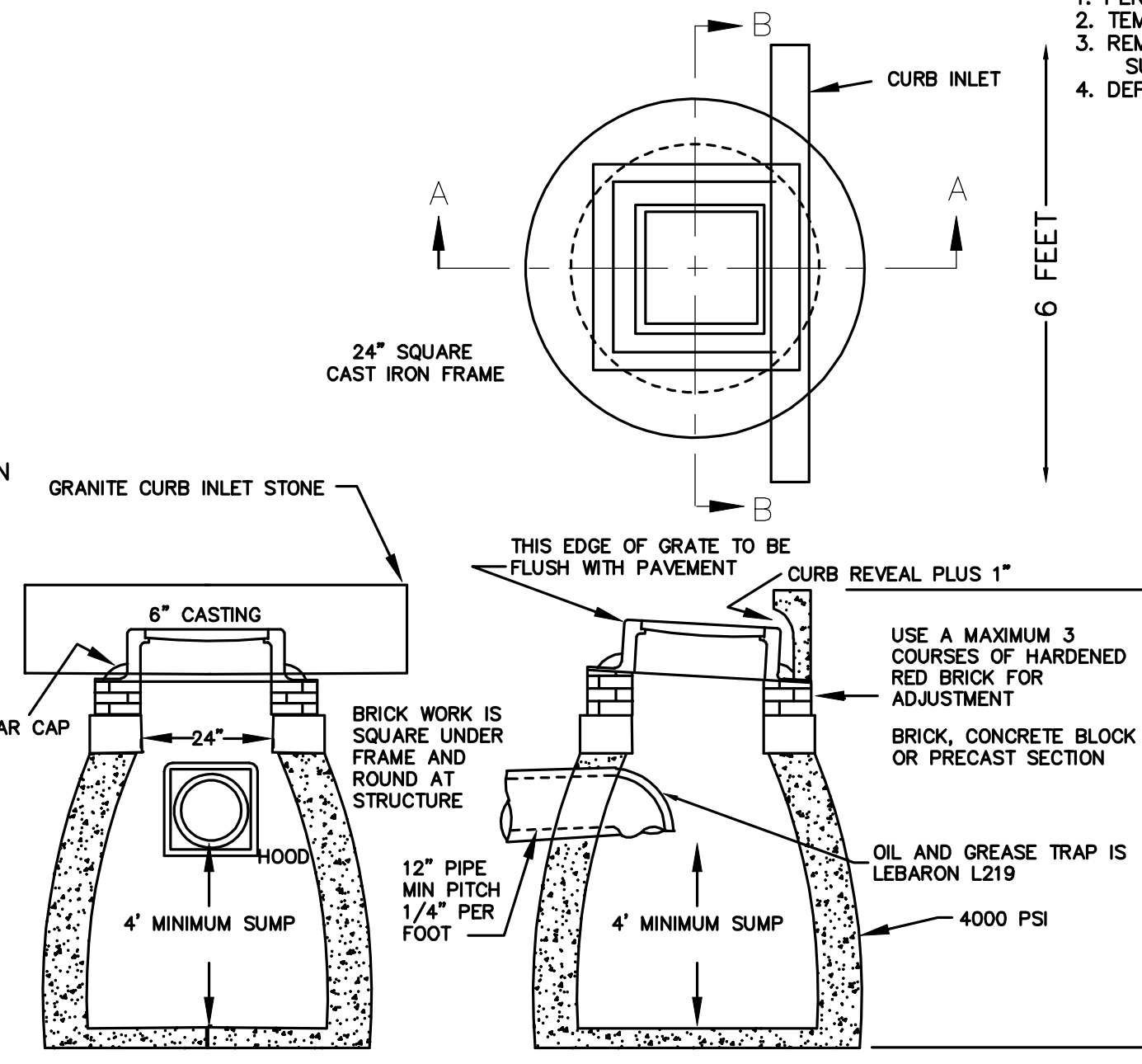
- PERMANENT TRENCH PAVEMENT PAYMENT WIDTH SHALL BE THE TRENCH PAY LIMIT PLUS 2 FEET.
- TEMPORARY TRENCH PAVEMENT PAYMENT WIDTH SHALL BE EQUAL TO THE TRENCH PAYMENT LIMIT.
- REMOVE AND DISPOSE ALL TEMPORARY PAVEMENT AS REQUIRED. RESTORE AND COMPACT SUBBASE AS REQUIRED PRIOR TO PERMANENT TRENCH PAVEMENT.
- DEPTH OF PERMANENT TRENCH PAVEMENT SHALL BE THE SAME THICKNESS AS THE EXISTING PAVEMENT.



FILTER FABRIC USE

	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED

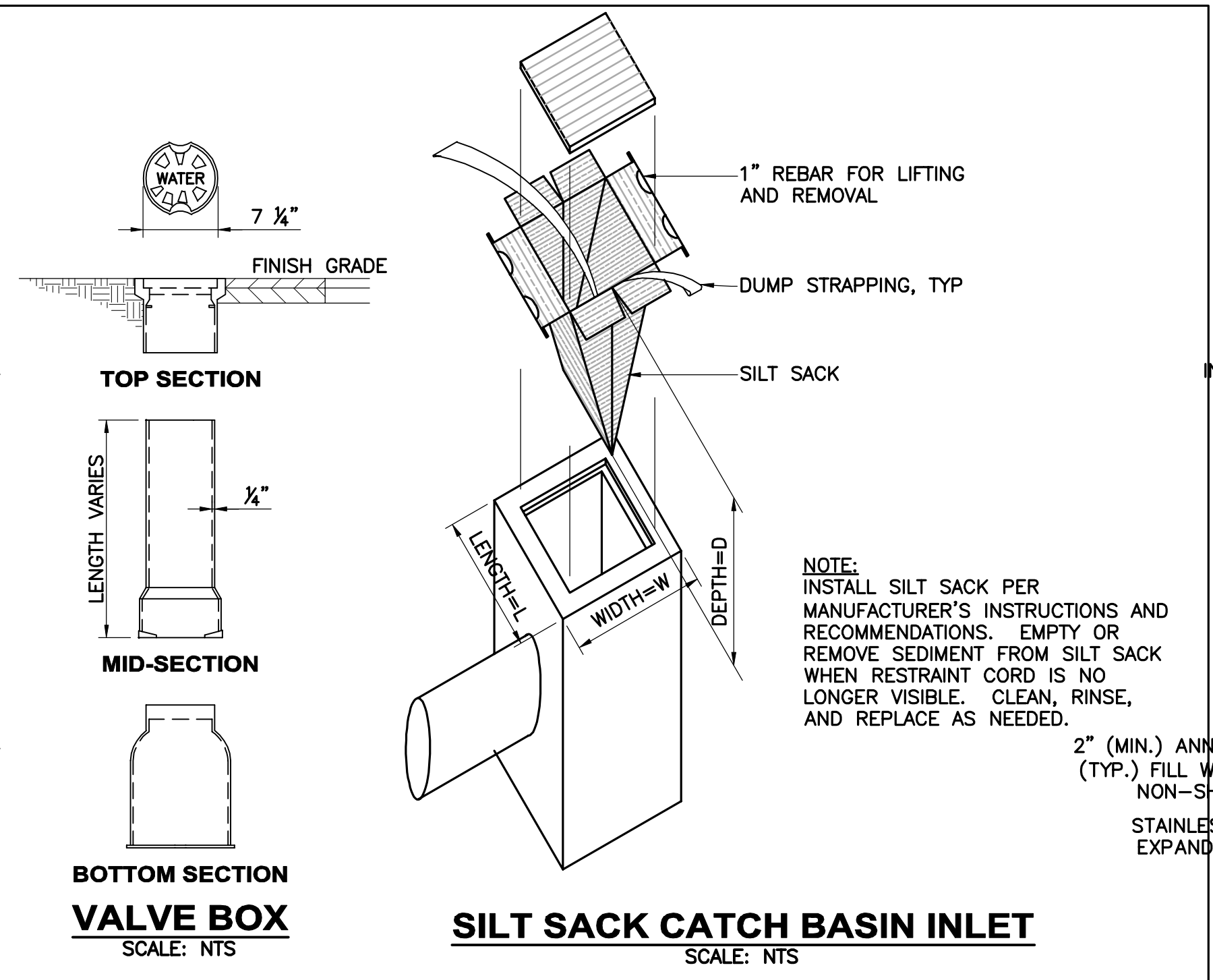
- NOTES:
- ALL TRENCHES MUST BE JETTED OR PUDDLED AS REQUIRED BY THE ENGINEER.
  - PRIOR TO FINISHING PAVING, CUT SQUARE EDGES AT EXISTING PAVEMENT, AT LEAST 6 INCHES BEYOND OUTERMOST DISTURBED PAVEMENT.
  - NO LEDGE TO BE WITHIN 6" OF PIPE.
  - TRENCH WIDTH:  
LEDGE: OUTSIDE DIAMETER OF PIPE PLUS 2 FEET  
EARTH: GREATER OF LEDGE VALUE OR 3 FEET (OR AS DETERMINED BY THE ENGINEER)



SECTION B-B

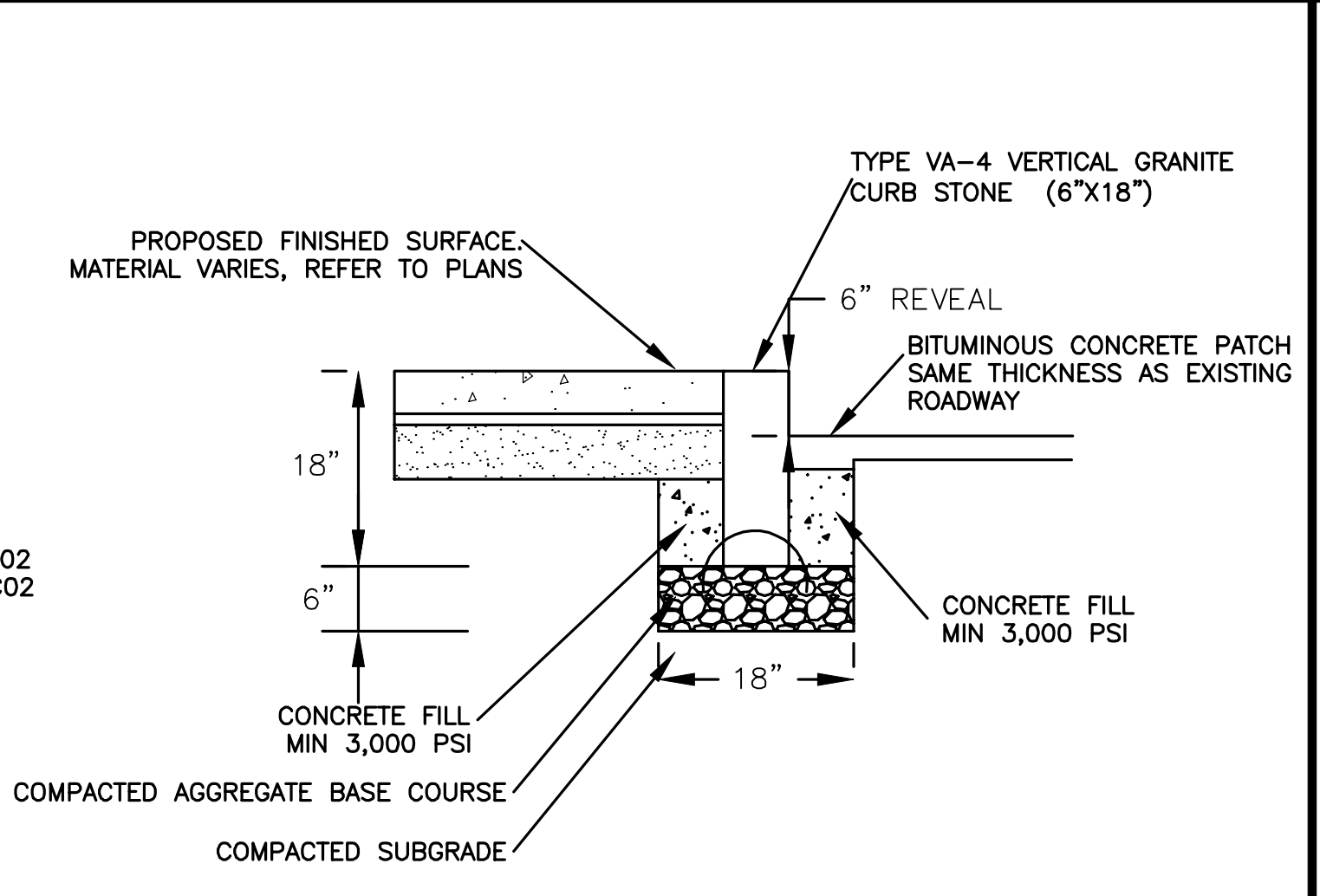
SECTION A-A

MAY BE CONSTRUCTED WITH 8" CONCRETE BLOCKS, A COMPLETE 5" PRECAST STRUCTURE, OR A COMBINATION OF 5" TO 8" PRECAST BASE SECTION AND 8" CONCRETE BLOCKS LAID ABOVE.

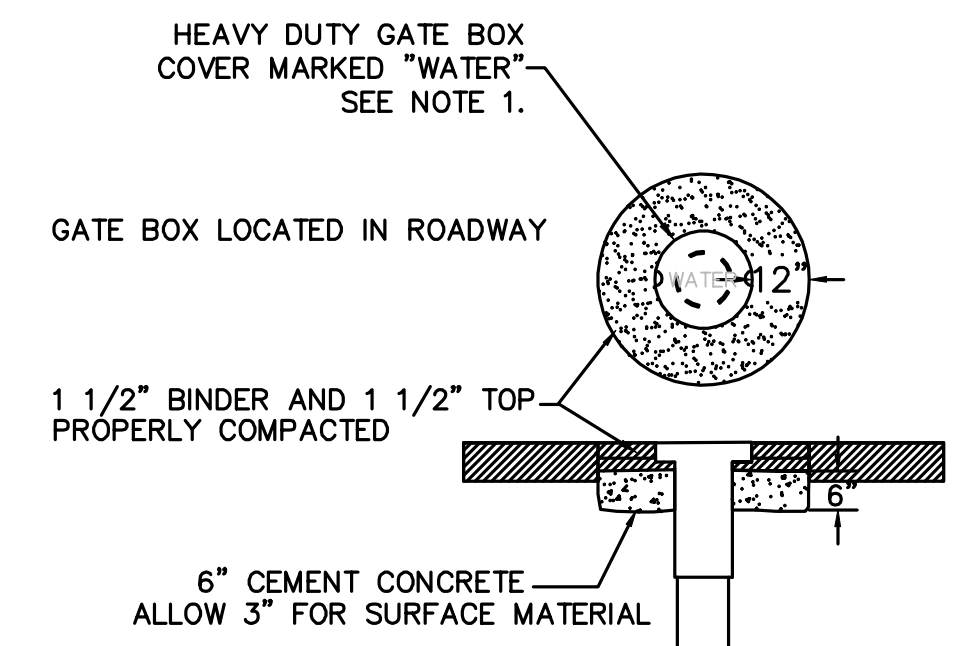


VALVE BOX SCALE: NTS

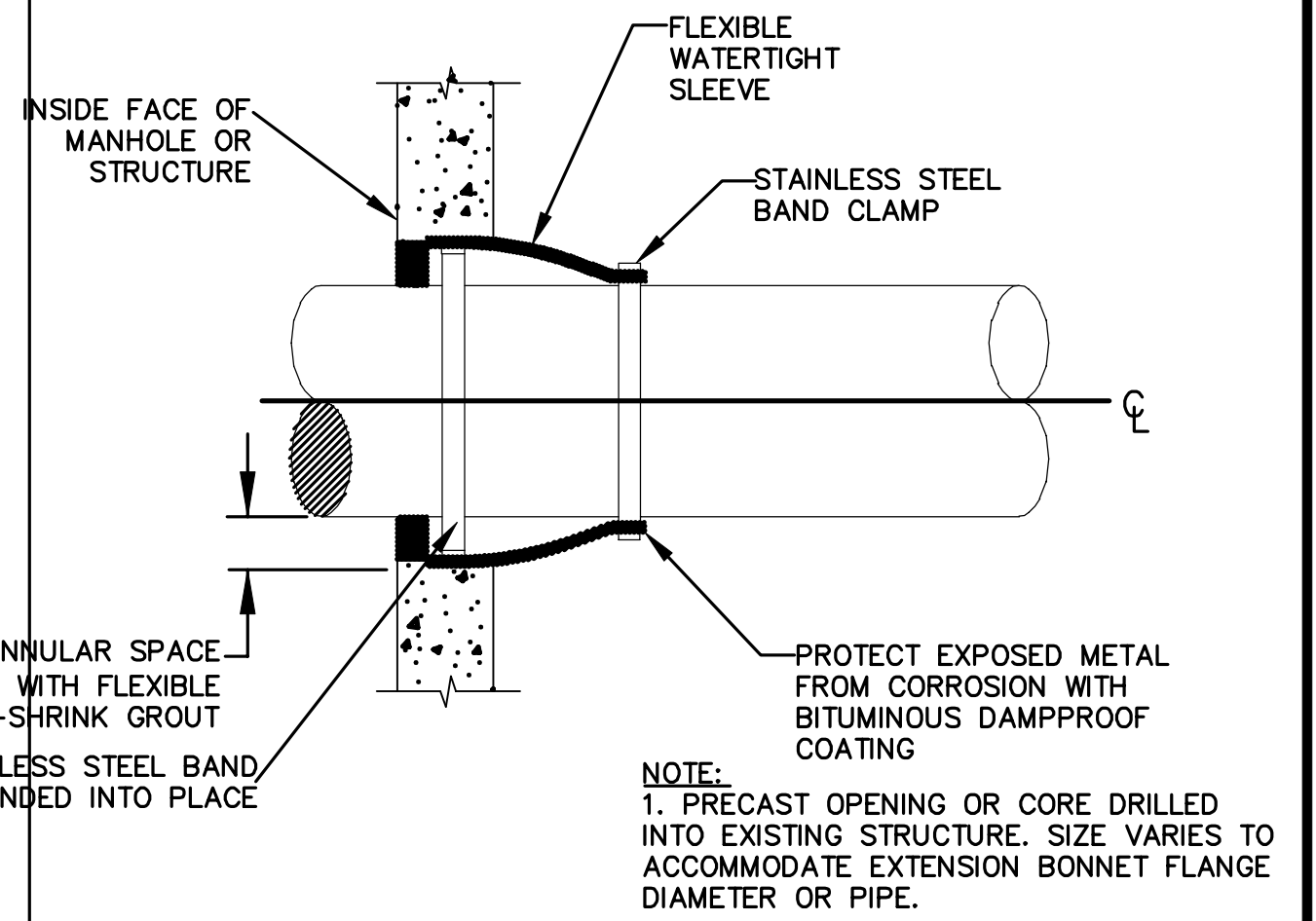
SILT SACK CATCH BASIN INLET SCALE: NTS



TYPICAL VERTICAL GRANITE CURB DETAIL



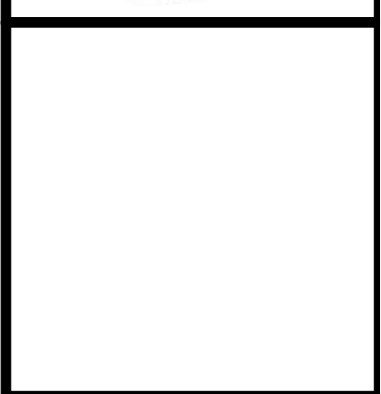
GATE BOX COLLAR DETAIL



FLEXIBLE SLEEVE CONNECTION DETAIL

WATER, SEWER, AND DRAIN TRENCH DETAIL

DATE	APP'D	REVISIONS
4-14	JEC	
		ISSUED FOR BID
		DESIGNED BY: RAS
		CAD: DNF/DJEC
		CHECKED BY: JEC
		DATE: 3-10-09
		APPROVED BY: RWJ
		DATE: 4-11-14
		PROJECT NO: 12858A



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